NAS 1.9/4:13/1

VOLUME 13/NUMBER 1
JANUARY 8, 1975
ACC. NOS. N75-10001 TO N75-10899

FEB 24 1975

STAR
AN ABSTRACT JOURNAL

Scientific and Technical Aerospace Reports

RECEIVED
MIAMI UNIVERSITY
LIBRARIES
FEB 4 1975
DOCUMENTS DEPARTMENT

PRODUCED BY THE
SCIENTIFIC AND TECHNICAL
INFORMATION
OFFICE

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PURCHASE OF *STAR*

The semimonthly issues and the cumulative index issues are available postpaid on subscription and in single copy from the Superintendent of Documents, United States Government Printing Office, Washington, D.C. 20402, United States of America.

Semimonthly issues. . .

Annual subscription rates: $66.90 domestic; $83.65 foreign. Price per single copy: $2.80 domestic; $3.50 foreign.

Cumulative index issues. . .

Annual subscription rates: $28.10 domestic: $35.15 foreign. Price per single copy varies according to number of pages.

Domestic subscription rates. . .

Apply to the United States, Canada, Mexico, and all Central and South American countries, except as noted below.

Foreign subscription rates. . .

Apply to Argentina, Brazil, French Guiana, Guyana, Surinam, British Honduras, and all other countries throughout the world.

Payment should be by check, money order, or document coupons, and must accompany order. Remittances from foreign countries should be made by international money order or draft on an American bank, payable to the Superintendent of Documents, or by UNESCO book coupons.

PUBLISHED BY:
UNITED STATES GOVERNMENT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
SCIENTIFIC AND TECHNICAL INFORMATION OFFICE
Scientific and Technical Aerospace Reports, Volume 13, is prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Informatics Information Systems Company.

The Administrator of the National Aeronautics and Space Administration has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through June 30, 1977.

SPECIAL NOTICE

REVISED STAR SUBJECT CATEGORIES

Beginning with this issue, a newly developed subject classification scheme will be used in *Scientific and Technical Aerospace Reports*. The scheme consists of 10 major subject divisions divided into 74 specific subject categories and one general category/division. It has been developed to reflect NASA and aerospace interests and programs under new national priorities. The major divisions are:

Aeronautics	Life Sciences
Astronautics	Mathematical and Computer Sciences
Chemistry and Materials	Physics
Engineering	Social Sciences
Geosciences	Space Sciences

Noteworthy new categories include Earth Resources, Energy Production and Conversion, Environmental Pollution, Cybernetics, and Space Transportation.

The subject divisions and categories, with scope notes and cross-references are presented in the Table of Contents.

INTRODUCTION

Scientific and Technical Aerospace Reports (STAR) is a major component of a comprehensive National Aeronautics and Space Administration information system covering aeronautics, space, and supporting disciplines. *STAR* is issued on the 8th and 23rd of each month and announces current publications of the following types:

- NASA, NASA contractor, and NASA grantee reports
- Reports issued by other U.S. Government agencies, domestic and foreign institutions, universities, and private firms
- Translations in report form
- NASA FEDD (For Early Domestic Dissemination) documents
- NASA-owned patents and patent applications
- Dissertations and theses

Cumulative index volumes are published semiannually and annually.

Journal, book, and conference literature, cover-to-cover journal translations, and certain foreign dissertations are announced in a companion journal, *International Aerospace Abstracts (IAA)*, available on subscription from the American Institute of Aeronautics and Astronautics, Technical Information Service, 750 Third Avenue, New York, N. Y. 10017.

ON-GOING RESEARCH PROJECTS

By arrangement between NASA and the Smithsonian Science Information Exchange (SSIE), a separate section of information on aerospace-related *On-Going Research Projects* is inserted into each issue of *STAR*. The insert presents titles of active NASA grants and university contracts, summary portions of recently updated *NASA Research and Technology Operating Plans (RTOP's)*, and notices of non-NASA research projects that were funded in the most recent or current fiscal year. The latter are selected by SSIE. The project announcements in the insert are arranged by *STAR* divisions but are otherwise entirely separate from *STAR*. They are not indexed nor machine-searchable by NASA. Current and retrospective searches are available from SSIE, 1730 M Street, N.W., Washington, D.C. 20036.

Subject scope of *STAR*, *IAA*, and *On-Going Research Projects* includes all aspects of aeronautics and space research and development, supporting basic and applied research, and applications. Aerospace aspects of earth resources, energy development, conservation, oceanography, environmental protection, urban transportation, and other topics of high national priority are also covered.

Other NASA publications and information services are described in a booklet, *The NASA Scientific and Technical Information System ... and How to Use It*, available without charge from the NASA Scientific and Technical Information Facility, P.O. Box 33, College Park, Maryland 20740.

CATEGORIES AND CROSS-REFERENCES

STAR is categorized by 10 major subdivisions divided into 74 specific subject categories and one general category/division. These are presented in the Table of Contents. Documents announced in *STAR* are not ordinarily cross-referenced between categories, except for certain conference reports or book translations that have had separate abstracts written for their component papers or chapters. Citations and abstracts of the components follow immediately after those of the parent document. When the subject content of a component differs sufficiently from the general content of the parent, a cross-reference citation also is printed at the end of the category to which it normally would have been assigned if it were independent.

AVAILABILITIES

One or more sources from which a document announced in *STAR* is available to the public is ordinarily given on the last line of the citation. The most commonly indicated sources and their acronyms or abbreviations are listed below. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

Avail: NTIS. Sold by the National Technical Information Service to U.S. customers at the price shown in the citation following the letters HC (hard, paper, or facsimile copy). Customers outside the U.S. should add $2.50 per copy for handling and postage charges to the price shown. (Prices shown in earlier *STAR* volumes, 1962-1974, have been superseded but may be calculated from the number of pages shown in the citation. The price schedule by page count was given in the last *STAR* issue of 1974 or may be obtained from NTIS.)

Microfiche[1] is available at a standard price of $2.25 (plus $1.50 for non-U.S. customers) regardless of age for those accessions followed by a "#" symbol. Accession numbers followed by a "+" sign are not available as microfiche because of size or reproducibility.

Initially distributed microfiche under the NTIS SRIM (Selected Research on Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Unit.

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the "*"symbol), use the N accession number.

NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number.

Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, at the standard $2.25 price, for those documents identified by a # symbol.)

(1) A microfiche is a transparent sheet of film, 105 by 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (Not to exceed 24: 1 reduction)

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 10546, or public document rooms located at each of the NASA research centers, the NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: AEC Depository Libraries Organizations in U.S. cities and abroad that maintain collections of U.S. Atomic Energy Commission reports, usually in microfiche form, are listed in *Nuclear Science Abstracts*. Services available from the USAEC and its depositories are described in a booklet, *Science Information Available from the Atomic Energy Commission* (TID-4550), which may be obtained without charge from the USAEC Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) at $10.00 each and microfilm at $4.00 each regardless of the length of the manuscript. Handling and shipping charges are additional. All requests should cite the author and the Order Number as they appear in the citation.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this Introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction).

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, California. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: ZLDI. Sold by the Zentralstelle fur Luftfahrtdokumentation und -Information, Munich, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: U.S. Patent Office. Sold by Commissioner of Patents, U.S. Patent Office, at the standard price of 50 cents each, postage free. (See discussion of patents and patent applications below.)

REPORTS AVAILABLE FOR EARLY DOMESTIC DISSEMINATION (FEDD)

NASA has initiated a program under which its technology having significant commercial potential will be disseminated to domestic organizations prior to its general publication. This program implements NASA's mission set forth in the Space Act to preserve the role of the United States as a leader in aeronautical and space science and technology. One of the mechanisms for acquainting domestic organizations with this early-access technology is through publication in *STAR*. The reported technology is identified by the subtitle "An Early Domestic Dissemination Report" in the *STAR* citation, and in addition, is referenced under the entry "Proj. FEDD" in the Contract Number Index. Interested domestic organizations may purchase FEDD reports from any of the following Regional Dissemination Centers:

Aerospace Research Applications Center (ARAC)(FEDD)
Indiana University
400 E. 7th Street
Bloomington, Indiana 47401

Knowledge Availability Systems Center (KASC)(FEDD)
University of Pittsburgh
Pittsburgh, Pennsylvania 15260

New England Research Application Center (NERAC)(FEDD)
Mansfield Professional Park
Box U-41N
The University of Connecticut
Storrs, Connecticut 06268

North Carolina Science and Technology Research Center (NC/STRC)(FEDD)
P.O. Box 12235
Research Triangle Park,
North Carolina 27709

Technology Application Center (TAC)(FEDD)
The University of New Mexico
Albuquerque, New Mexico 87106

Western Research Application Center (WESRAC)(FEDD)
University of Southern California
809 West 34th Street
Los Angeles, California 90007

Queries concerning FEDD program matters other than document orders should be addressed to:

Assistant Administrator for Industry Affairs
and Technology Utilization (Code K)
National Aeronautics and Space Administration
Washington, D.C. 10546

NASA PATENTS AND PATENT APPLICATIONS

Patents and patent applications owned by NASA are announced in *STAR* under appropriate subject categories and are referenced in the *STAR* indexes. In the Report/Accession Number Index, patents are indexed by the NASA Case Number (which appears in lieu of the report number in other indexes), the U.S. Patent Number, the U.S. Patent Application Serial Number, and the U.S. Patent Class. Patent applications for which patents have not yet been issued are indexed by the NASA Case Number and the U.S. Patent Application Serial Number.

NASA *patent application specifications* are sold by the National Technical Information Service at the price shown in the citation. Microfiche are sold at the established unit

price of $2.25. The US-Patent-Appl-SN- number should be used in ordering either paper copy or microfiche from NTIS. Printed copies of *patents* (which are not microfiched) are available for purchase at 50 cents per copy from:

Commissioner of Patents
U.S. Patent Office
Washington, D.C. 20231

When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, preferably by money order or check payable to the Commissioner of Patents. Prepaid purchase coupons for ordering are also available from the Patent Office. The patents and patent applications announced in *STAR* are owned by NASA and are available for royalty-free licensing. Requests for licensing terms and further information should be addressed to:

Assistant General Counsel for Patent Matters/Code GP-1
National Aeronautics and Space Administration
Washington, D.C. 20546

ELIGIBILITY AND REGISTRATION FOR NASA INFORMATION PRODUCTS AND SERVICES

A variety of services, in addition to the distribution of NASA scientific and technical reports and of *STAR* and its cumulative indexes, is available to organizations of the following types that have registered with NASA to receive specific services or products:

1. NASA offices, research centers, contractors, subcontractors, grantees, and consultants;
2. Other U.S. Government agencies and their contractors:
3. Libraries in the United States that have arrangements with NASA to maintain collections of NASA documents for public reference:
4. Other organizations in the United States having a need for NASA documents in work related to aeronautics and space research:
5. Organizations abroad that have established reciprocal document exchange arrangements with NASA.

Only the central service points or central points of document acquisition and control within qualified organizations are eligible to register for NASA products and services.
Domestic organizations that may be eligible to receive various classes of NASA publications and services should address their requests for registration or for further information to:

NASA Scientific and Technical Information Facility
Attn.: Registration Activity
P.O. Box 33
College Park, MD. 20740

Organizations abroad should direct requests to the same address, but to the attention of: Foreign Exchange and Acquisitions Branch.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
750 Third Ave.
New York, N.Y. 10017

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents
U.S. Patent Office
Washington, D.C. 20231

ESRO/ELDO Space Documentation Service
European Space Research Organization
114, av. Charles de Gaulle
92-Neuilly-sur-Seine, France

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Scientific and Technical Information
Facility
P.O. Box 33
College Park, Maryland 20740

National Aeronautics and Space
Administration
Scientific and Technical Information
Office (KSI)
Washington, D.C. 20546

National Technical Information Service
Springfield, Virginia 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Atomic Energy Commission
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

U.S. Geological Survey
1033 General Services Administration Bldg.
Washington, D.C. 20242

U.S. Geological Survey
601 E. Cedar Avenue
Flagstaff, Arizona 86002

U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey
Bldg. 25, Denver Federal Center
Denver, Colorado 80225

Zentralstelle für Luftfahrtdoku-
mentation und -Information
8 München 86
Postfach 880
Federal Republic of Germany

Volume 13 Number 1 / January 8, 1975

TABLE OF CONTENTS

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) N.A.

02 AERODYNAMICS 1

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

03 AIR TRANSPORTATION AND SAFETY 5

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 6

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 8

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION 12

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER 12

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL 14

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 14

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*.

12 ASTRONAUTICS (GENERAL) 16

For extraterrestrial exploration see *91 Lunar and Planetary Exploration*.

13 ASTRODYNAMICS N.A.

Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) 18

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air)*.

15 LAUNCH VEHICLES AND SPACE VEHICLES 19

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION N.A.

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING N.A.

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 20

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION N.A.
For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER 22
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) 24
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS 25
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY 26
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics*.

26 METALLIC MATERIALS 28
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 34
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS 35
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion*.

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics*.

31 ENGINEERING (GENERAL) 36
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS 37
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING 41
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

34 FLUID MECHANICS AND HEAT TRANSFER 45
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY 53
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation*.

36 LASERS AND MASERS 58
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING 60
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY 62
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS 63
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) 68

43 EARTH RESOURCES 69
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION 75
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation*.

45 ENVIRONMENT POLLUTION 79
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS 80
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY 81
Includes weather forecasting and modification.

48 OCEANOGRAPHY 86
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) 86
Includes genetics.

52 AEROSPACE MEDICINE 87
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES 90
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 90
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY 91
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) 91

60 COMPUTER OPERATIONS AND HARDWARE 91
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE 92
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS 93
Includes computer networks.

63 CYBERNETICS 93
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

64 NUMERICAL ANALYSIS 93
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 94
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS 94
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS 95
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

70 PHYSICS (GENERAL) 95
For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar Physics*.

71 ACOUSTICS 96
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution.*

72 ATOMIC AND MOLECULAR PHYSICS 97
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 97
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation.*

74 OPTICS 98
Includes light phenomena.

75 PLASMA PHYSICS 102
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics.*

76 SOLID-STATE PHYSICS 104
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS 107
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) 108
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 108
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 109
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS 109
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE 109
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 110
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) 111

89 ASTRONOMY 111
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 112
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 113
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 113
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 114
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

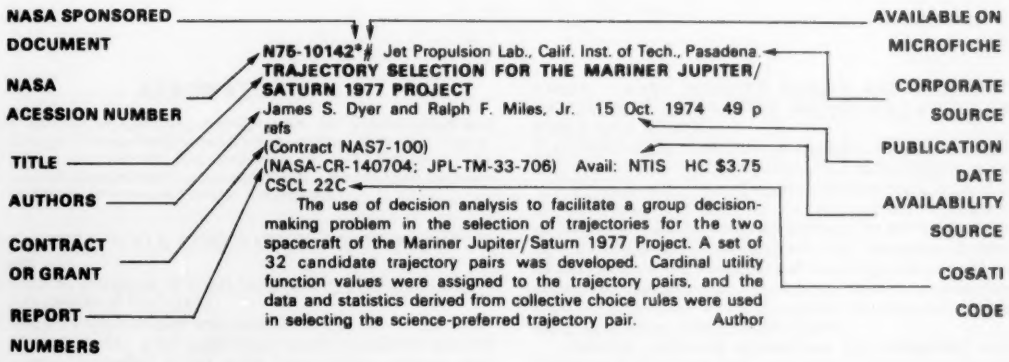
GENERAL

99 GENERAL N.A.

Note: N.A. means that no abstracts were assigned to this category for this issue.

SUBJECT INDEX I-1
PERSONAL AUTHOR INDEX I-43
CORPORATE SOURCE INDEX I-49
CONTRACT NUMBER INDEX I-61
REPORT/ACCESSION NUMBER INDEX I-65

TYPICAL CITATION AND ABSTRACT


NASA SPONSORED DOCUMENT
NASA ACESSION NUMBER
TITLE
AUTHORS
CONTRACT OR GRANT
REPORT NUMBERS
AVAILABLE ON MICROFICHE
CORPORATE SOURCE
PUBLICATION DATE
AVAILABILITY SOURCE
COSATI CODE
N75-10142*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena
TRAJECTORY SELECTION FOR THE MARINER JUPITER/ SATURN 1977 PROJECT
James S. Dyer and Ralph F. Miles, Jr. 15 Oct. 1974 49 p refs
(Contract NAS7-100)
(NASA-CR-140704; JPL-TM-33-706) Avail: NTIS HC $3.75
CSCL 22C
The use of decision analysis to facilitate a group decision-making problem in the selection of trajectories for the two spacecraft of the Mariner Jupiter/Saturn 1977 Project. A set of 32 candidate trajectory pairs was developed. Cardinal utility function values were assigned to the trajectory pairs, and the data and statistics derived from collective choice rules were used in selecting the science-preferred trajectory pair. Author

ON-GOING RESEARCH PROJECTS

This is a listing of research projects - not publications.

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power: Aircraft Stability and Control; and Research And Support Facilities (air). For Related Information See Also Astronautics.

1.0001, FULL SCALE CIRCULATION CONTROL ROTOR SYSTEM

UNKNOWN, Lockheed Aircraft Corporation, *Burbank, California* 91503 (N00019-73-C-0435)

Conduct design studies and analyses to determine the feasibility of constructing a full scale flight worth circulation control rotor system including a full scale rotor blade segment and hub/valve control mockup.

Certain manufacturing areas critical to the application of circulation control to helicopters must be investigated, analytical studies will be conducted to assess the level of risk associated with these areas. Various full scale hardware items will be constructed to verify the analytical studies. Items to be investigated will include but not be limited to: blade structure, blade dynamics, control systems, manufacturing techniques, compressor power, and autorotation characteristics.

Supporting agency address information: Naval Air Systems Command 320D, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0002, NAVY VEHICLE DESIGN AND CONSTRUCTION - THE CALCULATION OF UNSTEADY AIRFOIL CHARACTERISTICS BY THE METHOD OF CHARACTERISTICS

S. NADIR, Northrop Corporation, *Hawthorne, California* 90250 (N00014-73-C-0237)

The prediction of aircraft performance during rapid maneuvering, while encountering gusty environments, or to avoid flutter, requires a knowledge of unsteady aerodynamic forces. The purpose of this task is to develop a methodology for predicting two-dimensional unsteady flow fields about airfoils for a broad range of Mach numbers from subsonic to supersonic speeds and to apply this methodology to assess analytical approaches for such calculations.

Though rapid advances have been made in the numerical solution of complex flow problems, the calculation of unsteady aerodynamic flows about three dimensional configurations by finite difference techniques remains a distant goal because of the computing time involved. Approximate analytical techniques, however, invariably introduce assumptions such as small disturbances or high frequencies. The effects of the different analytical approximations can be assessed for two- dimensional flows by finite difference calculations so that three- dimensional analytical theories can be developed with a firmer foundation. This research will develop the method of characteristics for two-dimensional unsteady flow. Particular attention will be devoted for far field boundary conditions. Initially, symmetric time-dependent problems will be considered to establish techniques; then asymmetric flows will be treated.

Supporting agency address information: Office of Naval Research 438, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0003, NAVY VEHICLE DESIGN AND CONSTRUCTION - STUDIES IN SEPARATING BOUNDARY LAYERS ON AIRFOILS AND WINGS

T. CEBECI, Calif. State Univ. & Colleges, Graduate School, *Long Beach, California* 90804 (N00014-74-A-0203-0001)

This effort is directed towards developing a general method for calculating separating laminar and turbulent boundary layers on airfoils and wings. Accurate methods for predicting the viscous boundary layer characteristics are very important for the design of aircraft from the standpoint of reducing total aircraft drag and computing maximum lift. At present, there is no theoretical calculation procedure which is capable of accurately determining the drag of wings with separated flows.

Several promising approaches for computing separating boundary layers, turbulent and laminar, will be investigated. One approach will investigate the feasibility of modelling the turbulent separated region by an inviscid flow characterized by constant vorticity. This will circumvent the requirement in the governing equation of motion, the Navier Stokes Equation (NSE), for a suitable model of the turbulence process. Another approach will center on evolving schemes by which the boundary layer equation (simplified NSE) can be used to solve separated flow problem.

Supporting agency address information: Office of Naval Research 411, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0004, NAVY VEHICLE DESIGN AND CONSTRUCTION - ANALYTICAL INVESTIGATION OF TWO-ELEMENT AIRFOIL SYSTEMS

R.M. JAMES, McDonnell Douglas Corporation, *Long Beach, California* 90808 (N00014-72-C-0218)

Two-element airfoil high lift systems are very important for landing and take-off operations, and are increasingly used to improve other aspects of military flight, such as close-in combat maneuvering at high angles of attack. The purpose of this research is to develop the basic mathematics of design and flow analysis methods for two-element airfoil systems to an equivalent level of that of single element configurations with the ultimate goal of producing 'optimum' designs.

Techniques of conformal mapping and multiple image reflection are being used to solve problems connected with two disjoint circles and then to develop integral equations describing problems of real interest posed in a canonical domain-the annular space between two concentric circles. In addition, a general single airfoil mapping technique will be adapted to the problem of mapping two disjoint circles into two airfoils in close proximity to each other.

Supporting agency address information: Office of Naval Research 411, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0005, DEVELOPMENT OF GRAPHITE COMPOSITE A-4 HORIZONTAL STABILIZER

G.M. LEHMAN, McDonnell Douglas Corporation, *Long Beach, California* 90808 (N00156-70-C-1321)

To obtain improved aircraft structures through the use of high modulus graphite fiber reinforced composites. The use of composite structures will result in improved Naval aircraft performance because of reduced weight (approximately 26 percent

in this program) in addition to increased reliability and less maintenance.

Design, fabricate, and laboratory test a graphite composite A-4 stabilizer. The design will provide a significant advancement in composite structure technology. The program integrates various work areas, such as material optimization, strucutral design, load and stress analysis, process development, structural fabrication and testing. Intermediate components (I-beams and a box beam) are fabricated and tested to uncover problem areas before fabrication of the full-scale components.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 30331, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0006, DEVELOPMENT OF DC LOAD CONTROLLER (35 AMPERES)

W. WEAVER, Leach Corporation, *Los Angeles, California* 90003 (N62269-72-C-0710)

To develop, fabricate and test hybrid solid state DC load controllers for use in the solid state power distribution system of the AAES (Advanced Aircraft Electric System). Load controllers to perform in accordance with Navairdevcen Specification No. AEE-10.

Select power transistor chip, design control circuits, perform thermal analysis, fabricate breadboard and test. Package successful design using hybrid solid state techniques. Perform verification tests in accordance with Navairdevcen Specification No. AEE-10.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 3043, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0007, NAVY VEHICLE DESIGN AND CONSTRUCTION - THREE-DIMENSIONAL UNSTEADY FLOW THEORY

S.S. STAHARA, Nielsen Engin. & Research Inc., *Mountain View, California* 94040 (N00014-73-C-0379)

The prediction of aircraft performance during rapid maneuvering, while encountering gusty environments, or to avoid flutter, requires a knowledge of unsteady aerodynamic forces. The purpose of this task is to develop an accurate 'analytical' method for calculating the unsteady pressures, forces and moments on braod classes of three dimensional configurations (wings, slender bodies and wing-body combinations) at transonic speeds.

Though rapid advances have been made in the numerical solution of complex flow fields, the calculation of unsteady aerodynamic flows about three dimensional configurations by finite difference techniques, remains a distant goal because of the computing time involved. In the research under investigation, an analysis of oscillatory motion at transonic speeds will be undertaken. In this analysis it will be assumed that the oscillatory flow is a small perturbation on a basic nonlinear steady flow, which can be obtained theoretically or experimentally. The resultant equation for the oscillatory flow will be solved by the method of local linearization to predict the characteristics of three dimensional configurations.

Supporting agency address information: Office of Naval Research 438, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0008, NAVY VEHICLE DESIGN AND CONSTRUCTION - TWO-DIMENSIONAL UNSTEADY FLOWS AT TRANSONIC SPEED

H. YOSHIHARA, General Dynamics Corporation, *San Diego, California* 92112 (N00014-73-C-0294)

The prediction of aircraft performance: during rapid maneuvering, while encountering gusty environments, or to avoid flutter, requires a knowledge of unsteady aerodynamic forces. The purpose of this task is to develop a methodology for predicting two-dimensional unsteady flow fields about airfoils at transonic speeds and to apply this methodology to assess more approximate analytical approaches for such calculations.

Though rapid advances have been made in the numerical solution of complex flow problems, the calculation of unsteady aerodynamic flows about three dimensional configurations by finite difference techniques remains a distant goal because of the computing time required. Approximate analytical techniques, however, invariably introduce assumptions which can seriously limit the range of applicability of the analyses. The effects of the different analytical approximations can be assessed for two-dimensional flows by finite difference procedures, much like a numerical wind tunnel, so that three dimensional analytical theories can be developed on a firmer foundation. This research will develop finite difference equations for inviscid flow to handle truly unsteady transonic flows. Initially, pure sinusoidal pitching oscillations of airfoils will be studied.

Supporting agency address information: Office of Naval Research 438, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0009, A TECHNIQUE FOR PASSIVE LOCATION OF AIRBORNE RADAR TRANSMITTERS

S. WEISBROD, Teledyne Incorporated, *San Diego, California* 92120 (N00019-73-C-0272)

A theoretical and experimental study to determine the potential accuracy of passive ranging on an uncooperative airborne radar transmitter from a single airborne receiving platform, by measuring the angles of arrival of the direct and the sea-reflected electromagnetic wave components.

The theoretical aspects of this program will include an investigation of the (a) sea roughness and sea clutter, (b) signal-to-noise ratio of the multipath and direct signals and (c) propagation effects. The experimental part of this program will consist of making forward scatter measurements over a body of water, under varying degrees of surface roughness, and analyzing the results to determine the ability of the receiver to separate, in phase and amplitude, the electromagnetic wave components.

Supporting agency address information: Naval Air Systems Command 310B, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0010, MAINTENANCE TRAINING FOR AVIATION SYSTEMS

E.L. PARKER, Anacapa Sciences Incorporated, *Santa Barbara, California* 93102 (N61339-73-C-0091)

To identify areas of aviation maintenance training which can be supported by generalized training devices and develop an analytical tool which can be applied to the analysis of future maintenance training problems.

Based upon an analysis of tasks and hardware requirements for aviation maintenance training, analytic techniques will be developed which can be applied in the future to the identification of maintenance training requirements during the prime system development process. Design characterisitcs for generalized aviation maintenance trainers for current maintenance training problems will be derived.

Supporting agency address information: Naval Training Equipmen: Center N-215, Orlando, Fla. 32813.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0011, HIGH TEMPERATURE STRUCTURAL AND AEROELASTIC RESPONSE

L.E. ERICSSON, Lockheed Missiles & Space Co., *Sunnyvale, California* 94088 (N62269-73-R-0713)

To provide a well tested analytical method for solving a wide range of hypersonic aeroelastic problems with the inclusion of thermal effects on structural stiffnesses. A most important aspect of this analysis is the ability to handle geometric nonlinearities in both the structural and aerodynamic formulations.

Lockheed's nonlinear structural analysis computer code STAGS will be modified by the inclusion of required aerodynamic routines, structural analysis options and equation solving techniques. The program will be kept modular, and the methods selected will be the simplest and most physically transparent consistent with the required accuracy. The Navairdevcen will be pro-

vided with a tape of the extended STAGS and assisted in getting the program running on the CDC 6600.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 30331, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0012, FULL SCALE CIRCULATION CONTROL ROTOR SYSTEM

UNKNOWN, Kaman Corporation, *Bloomfield*, *Connecticut* 06002 (N00019-73-C-0429)

Conduct design studies and analyses to determine the feasibility of constructing a full scale flight worthy circulation control rotor system including a full scale rotor blade segment and hub/valve control mockup.

Certain manufacturing areas critical to the application of circulation control to helicopters must be investigated. Analytical studies will be conducted to assess the level of risk associated with these areas. Various full scale hardware items will be conducted to verify the analytical studies. Items to be investigated will include but not be limited to: blade structure, blade dynamics, control systems manufacturing techniques, compressor power and autorotation characteristics.

Supporting agency address information: Naval Air Systems Command 320D, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0013, DEFINE POTENTIAL BENEFITS OF USING AIRFOIL TECHNOLOGY ON HELICOPTER ROTORS

UNKNOWN, United Aircraft Corporation, *Stratford*, *Connecticut* 06497 (N00019-73-C-0225)

To promote the application of advanced airfoil technology to helicopter rotor design.

Based upon a five year projection of the state-of-the-art of those technologies constraining rotor design, the contractor will select an optimum airfoil for continued development, and will define in depth the research and development program with associated testing (including flight) required to prove the benefits of the advanced airfoil design.

Supporting agency address information: Naval Air Systems Command 530142C, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0014, NAVY VEHICLE DESIGN AND CONSTRUCTION - HELO INSTRUMENT SYSTEM TEST SUPPORT

R.J. JELLEY, E A Industrial Corporation, *Atlanta*, *Georgia* 30341 (N00014-73-C-0291)

This provides for the delivery in the U. S. and flight test support of an air data system for use on a U. S. test helicopter. This includes a 2-axis swiveable sensor probe, airspeed computer, altitude computer, and indicator; these comprise an exploratory system development by the Marconi-Elliott Avionics Systems Ltd., England. The following information is displayed: (1) all airspeeds, including forward, backward and sideways; (2) altitude; (3) altitude rate; (4) rotor thrust vector changes.

Flight tests under separate procurement, are being conducted in a UH-LM helicopter using this instrumentation by the U. S. Army Aviation Systems test activity. This work unit provides for engineering support services by the contractor during the test period and lease of such equipment as required. This is a portion of the Joint Army-Navy Aircraft Instrumentation Research (JANAIR) program.

Supporting agency address information: Office of Naval Research 411, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0015, STUDY OF WAKE BOUNDARY LAYER INTERACTION

S.H. GORADIA, Lockheed Georgia Company, *Marietta*, *Georgia* 30060 (N00019-73-C-0239)

Provide better understanding of the flow phenomena on high lift systems and provide better design techniques for future Navy aircraft.

Utilize a combined wind tunnel/analytical approach to study the interaction of a wake trailing off a wind with the surface boundary layer on an AFT flap component.

Supporting agency address information: Naval Air Systems Command 530142B, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0016, HELICOPTER ROTOR BLADE DYNAMICS 4846-E

N.C. HAM, Mass. Inst. of Technology, School of Engineering, *Cambridge*, *Massachusetts* 02139 (DA-31-124-ARO(D)-247)

To study the interaction of a vortex with a rotating blade. This work on the effect of dynamic stall on the blade loading due to interaction between the helicopter rotor blade and a tip vortex is of critical interest to current Army helicopter research.

Approach - blade airload distributions will be measured for a three-bladed rotor. The effects of blade aeroelasticity and blade flapping on the airloads at high advance ratios will be investigated.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706.

SUPPORTED BY U.S. Dept. of Defense - Army

1.0017, ENERGY CONVERSION - STUDIES OF TRANSONIC TURBINES WITH FILM-COOLED BLADES

J.F. LOUIS, Mass. Inst. of Technology, Division of Sponsored Res., *Cambridge*, *Massachusetts* 02139 (N00014-67-A-0204-0079)

The objective of this project is to gather the necessary data essential in developing design procedures for high performance, cooled, highly loaded, transonic turbine stages. The effort is theoretical and experimental in nature and is aimed at reducing the amount of cooling required per unit of work extracted. The research will contribute to increased performance of gas-turbine engines needed particularly for Naval aircraft propulsion, but useful as well to Marine power plants and fixed installations.

Study will be made of heat transfer and shock-film interaction in the blade passages in optimizing performance and design and blade passages and secondary flow injection. First year effort will concern theoretical analysis to determine optimum profiles for transonic turbines and a test program to investigate supersonic film flow effects upon film separation. Shadowgraphs will be used for flow visualization.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0018, MAXIMUM PERFORMANCE EJECTION SEAT (MPES)

W. BEDHUN, Honeywell Incorporated, *Minneapolis*, *Minnesota* 55408 (N00156-71-C-0226)

To develop a pitch stabilization subsystem for the MPES which requires minimum maintenance and has high reliability.

Applying fluidic techniques, a high pressure, high flow rate system will be developed which utilizes a vortex rate sensor for sensing pitch rate, a cascade of fluid amplifiers and an adaptor to inject a suitable fluid into the rocket plume to effect a change in the thrust vector.

Supporting agency address information: Naval Air Development Center, Crew Systems Dept. 401104, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0019, F-4 FLIGHT CONTROL SIMULATOR('IRON BIRD') EVALUATION OF HYDRAULIC FLUID PHASE III

N. PIERCE, McDonnell Douglas Corporation, *St. Louis*, *Missouri* 63166 (N62269-74-C-0161)

To assess the impact of the MS-5 fluid on F-4 hydraulic system performance and define any flight envelope limitations and/or modifications required before flight evaluation.

The Phase II program will consist of a 150 hour endurance test, a utility suction system pressure drop test, a directional con-

trol system damper test, a wheel brake performance and skid test, and a subsystem computer analysis.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 30211, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0020, F-4 FLIGHT CONTROL SIMULATOR ('IRON BIRD') EVALUATION OF HYDRAULIC FLUID PHASE III

N. PIERCE, McDonnell Douglas Corporation, *St. Louis, Missouri* 63166 (N62269-74-C-0161)

To assess the impact of the MS-5 fluid on F-4 hydraulic system performance and define any flight envelope limitations and/or modifications required before flight evaluation.

The Phase II program will consist of a 150 hour endurance test, a utility suction system pressure drop test, a directional control system damper test, a wheel brake performance and skid test, and a subsystem computer analysis.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 30211, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0021, COMPRESSOR BLADE AEROELASTIC STABILITY

F. SISTO, Dynalysis of Princeton, *Princeton, New Jersey* 08540 (N00019-73-C-0368)

To develop a method for predicting the vibration characteristics of transonic and supersonic axial compressor blades.

Dynamic modelling of the compressor blade as a thin twisted shell of variable thickness. The time dependent loading of the shell is aerodynamic and the problem solution selected will predict either the free vibration, the forced vibration or the flutter conditions of the blade.

Supporting agency address information: Naval Air Systems Command 310, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0022, INVESTIGATION OF VARIATIONS IN APPROACH POWER COMPENSATOR SYSTEM

E. SECKEL, Princeton University, School of Engineering, *Princeton, New Jersey* 08540 (N00019-74-C-0365)

To determine how variations in the characterisitics of approach power compensator systems affect the flying qualities of Navy aircraft.

Phase III will apply results to a wide range of airframe dynamics and engine response characteristics.

Supporting agency address information: Naval Air Systems Command 530141B, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0023, NAVY VEHICLE DESIGN AND CONSTRUCTION - TRANSONIC SEPARATED FLOW STUDIES FOR NAVAL AIRCRAFT

R.J. VIDAL, Calspan Corporation, *Buffalo, New York* 14221 (N00014-71-C-0165)

The performance of aircraft at transonic speeds is severely limited during maneuvering by adverse shock-boundary layer interactions and flow separation on the wind. Though the effects of these phenomena on aerodynamic characteristics have been studied in the laboratory, the measurements have inadequately simulated viscous effects-resulting in serious problems when the laboratory data have been applied to the design of full scale aircraft. The present investigation will study, experimentally, shock boundary layer interaction at transonic speed with full scale viscous simulation to provide basic data leading to a more complete understanding of these complex flows and to provide for the development of viscous scaling laws.

Accurate aerodynamic data for aircraft and missile design needs, requires matching the Reynolds number as well as the Mach number in laboratory tests. Because of the extreme expense of conventional laboratory equipment to accomplish this match at transonic speeds, such testing has usually been performed at reduced Reynolds numbers--leading in several instances to serious airplane deficiencies. The present investigation will study shock boundary layer interaction at full scale Reynolds numbers at transonic speeds in a short duration tube wind tunnel. Though the running time will be short, about 40 milliseconds, sufficient time will be available to develop steady flow, and enable total pressure and static pressure surveys to be made. In the interaction region, the surface shear and wall static pressure will be measured.

Supporting agency address information: Office of Naval Research 438, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0024, NAVAL VEHICLE DESIGN AND CONSTRUCTION - UNSTEADY VISCOUS FLOWS

J.G. HALL, State University of New York, School of Engineering, *Buffalo, New York* 14214 (N00014-72-C-0373)

Unsteady viscous flows which occur, for example, on aircraft wings during buffeting and stall, and in aircraft propulsion systems seriously affect performance throughout the speed range. Current viscous flow research has been overwhelmingly concerned with steady flows. It is the purpose of the proposed research to study, experimentally and theoretically, unsteady laminar and turbulent boundary layers over a broad range of Reynolds numbers in a tube-type wind tunnel at low speeds.

The use of a short duration tube-type wind tunnel is a simple yet powerful method for the experimental study of unsteady viscous flows. An extremely reproducible viscous flow will be generated either on the walls of the tube or on a model supported in the tube. Though the flow will last for only milliseconds, it will be long enough for detailed measurements utilizing pressure and skin friction gages, resistance thermometers, pitot probes, and hot-film and hot-wire probes. Laminar and turbulent boundary layers will be studied with Reynolds numbers ranging up to full scale. Major emphasis will be devoted to the study of turbulent boundary layers, including comparisons of the experimental results with integral methods for prediction. The relaxation of the time-dependent flow to steady state will be followed.

Supporting agency address information: Office of Naval Research 438, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0025, NAVY VEHICLE DESIGN AND CONSTRUCTION - VORTEX FLOW INTERACTION BETWEEN TANDEM LIFTING SURFACES

R.W. HALE, Sage Action Incorporated, *Ithaca, New York* 14850 (N00014-72-C-0200)

To more completely understand the reduction of aerodynamic interaction problems occurring between auxiliary or canard surfaces and the main lifting surfaces of high performance Naval aircraft, a theoretical method will be formulated and verified for the solution of such interaction problems.

Theoretical methods for the prediction of non-linear vortex lift for close-coupled canard lifting surfaces will be explored, and an analytical technique will be verified by wind tunnel model testing, aided by an advanced flow visualization technique.

Supporting agency address information: Office of Naval Research 411, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0026, NAVY VEHICLE DESIGN AND CONSTRUCTION - THEORETICAL STUDIES OF LOW AND HIGH SPEED VISCOUS FLOWS

S. WEINBAUM, City University of New York, School of Engineering, *New York, New York* 10031 (N00014-72-A-0406-0002)

The development of methods for the accurate prediction of viscous flow phenomena is essential for the design and optimization of aircraft, ships and missiles. The proposed research will study a broad class of viscous flow problems relating to: (1) separation on control surfaces at supersonic speeds; (2) new methods for predicting heat and mass transfer; and (3) new modelling concepts for low Reynolds number flows.

Existing analytical theories of the free-interaction of a supersonic inviscid flow with a boundary layer are inadequate when the boundary layer is either turbulent or laminar and supercritical. The proposed research will treat, more precisely, the coupling of the free- interaction zone and the viscous layer very close to the wall, to develop a non-linear theory capable of predicting upstream influences. Heat and mass transfer effects will be studied by the development of an improved Oseen theory. Low Reynolds number modelling will treat 'longitudinal co-ordinate stretching' to enable the prediction of wake formation and drag at intermediate Reynolds numbers for flow past blunt bodies.

Supporting agency address information: Office of Naval Research 438, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0027, NAVY VEHICLE DESIGN AND CONSTRUCTION - WALL INTERFERENCE IN TRANSONIC WIND TUNNELS

A. FERRI, Advanced Technology Labs. Inc., *Westbury, New York* 11590 (N00014-72-C-0201)

The design of aircraft and missiles for optimum performance at transonic speed depends critically upon experimental data obtained in transonic wind tunnels. Furthermore, the requirement of high Reynolds number data invariably means large model size, a condition which leads to large wind tunnel wall effects of unknown magnitude which seriously degrade the data. The purpose of this research is to develop a method, incorporating two sets of experimental measurements, for eliminating or significantly reducing wind tunnel wall corrections at transonic speeds.

At transonic speeds the porous or slotted geometry of wind tunnel walls makes the accurate determination of corrections, due to the finite domain of the flow, exceedingly difficult. As yet, there is no accurate method for making such determination. The present approach proposes the use of two sets of experimental measurements far from the model to establish procedures for varying the porosity or slot geometry to obtain, in principle, correction-free flow. In a real system where the ideal wall-free condition probably can only be approached, the data will provide a means for establishing the magnitudes of the small corrections that remain. This study will examine theoretical techniques for relating the measurements to the necessary changes in wall geometry for the wall- free conditions. In addition, experiments will be planned and analyzed to verify the concept.

Supporting agency address information: Office of Naval Research 438, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0028, DEVELOPMENT OF ADVANCED FLIGHT CONTROL ACTUATION CONCEPTS FOR NAVAL AIRCRAFT

J. DEMARCHI, Rockwell International Corp., *Columbus, Ohio* 43216 (N62269-73-C-0405)

The general objective of this task is to examine the broad spectrum of new flight control actuation concepts with respect to potential advantages and interrelationships with other aircraft systems. The resultant effect of these new concepts will be evaluated against projected aircraft mission and maintenance requirements. Recent advancements in high pressure hydraulics, onboard computers, electrical power generation and solid state processing components may offer advantages to new aircraft, especially with growing emphasis on combat survivability and simplified squadron maintenance. The specific objective of this task is to compare alternate concepts with traditional hydraulic systems to provide a basis for advising Navairsyscom on best candidate systems for development.

Airframe manufacturers and flight control actuation specialists will be contracted to investigate innovative concepts for maneuvering aircraft. A development guide which emphasized the importance of concepts which will increase aircraft availability, lower vulnerability, and minimize cost will be prepared for solicitation of proposals. Selection of one or more concepts for detailed engineering analysis will be followed by hardware demonstration contracts. In-house work will include: (1) studies leading to contract specifications, and (2) testing of components to determine impact on total aircraft performance.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 3041, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0029, MAXIMUM PERFORMANCE EJECTION SEAT (MPES)

M. FRANKEL, Budd Company, *Fort Washington, Pennsylvania* 19034 (N62269-72-C-0326)

To perform engineering analysis and provide the mechanical design for the MPES. To incorporate into that design the various subsystems and components and define all required interfaces.

Operational requirements will be defined, stress analysis will be performed and material requirements defined. An overall mechanical design will be prepared and prototypes will be fabricated. Subsystem and components interfaces will be defined and mechanical designs will be provided.

Supporting agency address information: Naval Air Development Center, Crew Systems Dept. 401104, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0030, CONDUCT A STUDY OF A TRANSONIC AIRFOIL EMPLOYING TRAPPED VORTEX BOUNDARY LAYER CONTROL

C.S. WELLS, Advanced Technology Ctr. Inc., *Dallas, Texas* 75222 (N00019-73-C-0426)

Long range objectives are to reduce the cruise drag and to increase the transonic maneuver capability of Navy airplanes through the use of a trapped-vortex-diffusion boundary layer control device mounted on the top of the wing.

The contractor will conduct the study with emphasis in two areas, transonic wing and STOL (Short Take-Off and Landing) variation. He will formulate criteria for transonic trapped vortex power requirements, perform a first order configuration analysis using simularity methods, and will refine configuration design by including shock simulation and relaxing small perturbation assumptions. The contractor will also perform tests in the two-dimensional channel facility extending the STOL wind tunnel results to alternate leading edge flap deflections (approximately 0 degrees and 15 degrees) and rear flap. The cruise configuration to that of highest lift will be evolved and tested in the channel at the appropriate flap deflections.

Supporting agency address information: Naval Air Systems Command 530142A, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0031, ELECTRICAL SYSTEM MATRIX AND CONFIGURATION CONTROL FOR SOSTEL (SOLID STATE ELECTRIC LOGIC) SYSTEM

A.J. MAREK, Vought Aeronautics Company, *Dallas, Texas* 75222 (N62269-73-C-0402)

To provide a matrix of control signal functions and load characteristics for aircraft systems, determine the optimum number of controller ratings and determine a technique for providing configuration control for the data handling system.

Perform a compatibility study of power controllers and representative aircraft loads to determine if all the presently sized power controllers are required. Survey control signals and loads to develop a design matrix. Survey configuration control techniques to determine most feasible approach.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 3043, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0032, ENGINEERING ANALYSIS OF FUTURE AIRBORNE NAVIGATION, COMMAND, AND CONTROL AND COMMUNICATION REQUIREMENTS

R.G. SMITH, Telcom Incorporated, *McLean, Virginia* 22101 (N62269-73-C-0759)

The objective of this task is to aid in the development of future navy airborne navigation, command, control and communications systems.

A review of Navy requirements will be carried out which will include an analysis of the JCS master navigation plan from the

Navy Viewpoint. This review will analyze the JCS plan in terms of its relevance, its emphasis, and the degree to which it provides adequate guidance for future effort in this area. It will include a study of priorities; missing or weak elements, if any; increased capabilities resulting from recent developments in relative grid integrated navigation, and finally, it will develop concrete recommendations for future development effort.

Supporting agency address information: Naval Air Development Center, Aero-Electron Tech. Dept. 2034, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0033, NAVY VEHICLE DESIGN AND CONSTRUCTION - MATHEMATICAL MODELING OF JETS FOR VTOL WINGS IN TRANSITION

J.L. LOTH, West Va. University, School of Engineering, *Morgantown, West Virginia* 26506 (N00014-73-A-0417-0003)

To develop mathematical models for predicting the behavior of hypermixing nozzles and two-dimensional curved exhaust jets for application to VTOL performance analysis. These models will be applied to predict both the internal aerodynamics of VTOL-type augmenters and the aerodynamic performance of an entire wing in transition.

New Jet Entrainment Mathematical Models will be devised on the basis of a review and analysis of the most suitable lifting Jet Mathematical Models currently available. Predicted flow parameters such as jet velocity profile, spreading rate, and entrainment rate will be compared with observed experimental data derived from this task.

Supporting agency address information: Office of Naval Research 411, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

ASTRONAUTICS

Includes Astronautics (general); Astrodynamics; Ground Support Systems and Facilities (space); Launch Vehicles and Space Vehicles; Space Transportation; Spacecraft Communications; Command and Tracking; Spacecraft Design, Testing, and Performance; Spacecraft Instrumentation; and Spacecraft Propulsion and Power. For Related Information See Also Aeronautics.

2.0001, NAVIGATION - CONTINUOUS REAL-TIME POSITION UPDATING

L.E. GANTER, Magnavox Company, *Fort Wayne, Indiana* 46804 (N00014-71-C-0175)

Navy requirements for a global, all-weather passive system for precision navigation are being partially satisfied by the Navy Navigation Satellite System (NNSS) which permits periodic position fix capability at one to five hour intervals. The satellites in the NNSS constellation are undergoing design modifications and are increasing in numbers such that existing shipboard NNSS equipments require periodic updating.

The contractor will execute software program modifications for the AN/WRN-4 to provide for increased sampling rate of course and speed information from shipboard sensors together with appropriate interfaces to permit continuous rapid update of deduced reckoning positions between satellite-determined positions.

Supporting agency address information: Office of Naval Research 480D, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Materials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, MATERIALS SUPPORT TECHNOLOGY - STUDIES OF BORON COMPOUNDS FOR HEAT RESISTANT PLASTICS AND RUBBERS

C.T. OKONSKI, Univ. of California, School of Chemistry, *Berkeley, California* 94720 (N00014-69-A-0200-1061)

Plastic and rubbery materials superior to those currently available are needed for use in high performance systems such as Naval aircraft. This research provides an experimental test of theoretical predictions of the electronic structures of high temperature elastomers containing boron. Information on the electronic structures of these materials is needed to guide efforts to improve their properties.

Nuclear quadrupole resonance spectra of carborane-siloxane polymers and monomers, carboranes, carborane derivatives and related boron compounds are being obtained. Molecular orbital calculations are being made to obtain theoretical predictions of these spectra. Comparisons of the experimental and theoretical spectra are being made so that the theory of bonding in these compounds can be extended and improved.

Supporting agency address information: Office of Naval Research 472, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0002, WEAPONRY - MATRIX ISOLATION AND FLASH PHOTOLYSIS TO PREPARE AND IDENTIFY NEW CHEMICAL SPECIES OF PROPULSION INTEREST

G.C. PIMENTEL, Univ. of California, School of Letters, *Berkeley, California* 94720 (N00014-69-A-0200-1025)

New or improved chemical rocket propellants are needed for the propulsion system of Navy vehicles for tactical and surveillance missions in the atmosphere and nearby space. This research focuses upon the bonding and structure of extremely reactive molecules including free radicals, and novel compounds of the light elements. It has general relevance to the chemistry of high temperature flames and explosions and to the development of new, high energy propellant ingredients.

The investigations are continuing to use flash photolysis and pulsed deposition to form low temperature matrices to isolate and study reactive species. Rapid scan infrared spectroscopy, with appropriate isotope labeling, is being used to identify intermediate species.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0003, MATERIALS SUPPORT TECHNOLOGY - POLYMERIC MATERIALS WITH SPATIAL GRADIENTS IN STRUCTURE AND PROPERTIES

M.C. SHEN, Univ. of California, School of Engineering, *Berkeley, California* 94720 (N00014-69-A-0200-1053)

The use of polymeric materials by the Department of Defense is all pervasive, varying widely in form and function from rubber tires to hydraulic fluids. The properties of such materials are sensitive to the chemical nature and physical arrangement of constituent long chain molecules. This research provides a means for introducing controlled structural variations to improve the performance of plastics and rubbery materials in military applications such as noncrazing aircraft windows noise, shock and vibration absorbers and plastic gasoline tanks.

Chemical and physical methods for generating ordered, spatial variations in the composition, structure and properties of polymers are investigated. These studies will cover alternative preparative and characterization techniques as well as mechanical and transport properties. Emphasis will be placed on determining relative merit and limits of promising approaches and the development of property-structure relationships in model systems.

Supporting agency address information: Office of Naval Research 472, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0004, DISPOSAL OF PROPELLANTS AND EXPLOSIVES IN A FUSED SALT BATH

S.J. YOSIM, Rockwell International Corp., *Canoga Park, California* 91304 (N00017-73-C-4331)

Develop processes by which a fused salt bath can be used for the disposal of explosives and propellants with a minimum of pollution.

The following explosives and propellants are being used: TNT, COMP. b, TETRYL, HBX-3, PBXW-106, EJC, NOSOL-SGP-30A, PL 6301, N-5, ANP,2915 and PBAN. Tests are being continued to learn how large a sample can be put into the combustion zone without danger, and how to reduce the emission of smoke and noxious gas.

Supporting agency address information: Naval Ordnance Systems Command 0332B, Washington, D.C. 20360.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0005, NAVY VEHICLE DESIGN AND CONSTRUCTION - STRENGTH AND TOUGHNESS OF TITANIUM ALLOYS

J.C. WILLIAMS, Rockwell International Corp., *Los Angeles, California* 90009 (N00014-67-C-0439)

Titanium alloys are used in deep submergence hulls, blading in turbojet engines, airframes, and hydraulic lines. Titanium's low density, one-half that of steel, offers significant weight savings in vehicles. This research project is aimed at providing needed strength and toughness improvements in titanium alloys.

Formation of alpha precipitate will be examined in metastable beta titanium alloys from theoretical and experimental standpoints. Factors which can affect the alpha phase morphology will be determined. The effect of hydrogen on microstructure and mechanical properties of alpha and alpha-beta titanium alloys will be evaluated and an attempt will be made to correlate mechanical property changes resulting from hydrogen with damping behavior.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0006, WEAPONRY - GALLIUM NITRIDE MATERIALS

M. GERSHENZON, Univ. of Southern California, School of Engineering, *Los Angeles, California* 90007 (N00014-67-A-0269-0024)

The objective of this task is to investigate and characterize semiconductor materials which theoretically promise the higher frequency and higher power outputs required of advanced weaponry concepts.

Thin films of single crystalline gallium nitride will be grown (by vapor phase epitaxy) on various substrates. Fundamental properties such as carrier mobility, carrier drift velocity, and impact ionization constant will be determined. Diode characteristics will be evaluated and an assessment of the material usefulness and applicability will be rendered.

Supporting agency address information: Office of Naval Research 427, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0007, WEAPONRY - EXPLOSION SENSITIVITY AND DECOMPOSITION KINETICS OF HIGH ENERGY LIQUID COMPOUNDS

M.E. HILL, Stanford Research Institute, *Menlo Park, California* 94025 (N00014-70-C-0190)

New or improved chemical rocket propellants are needed for the propulsion systems of Navy vehicles for tactical and surveillance missions in the atmosphere and nearby space. This task is a part of the program on the sensitivity of dinitroalkanes compounds and other related explosive liquids seeking understanding of the relationship of structure to the explosion sensitivity of high energy materials for propellants.

The studies of low velocity detonation and detonation wave failure are being brought to completion. The effort is currently emphasizing the decomposition at static high pressures of energetic compounds of interest. Measurements are to be made of thermal explosion times at pressures of 1 and 10 Kbar. To obtain details of the reaction isotopic tracers and radical scavengers are to be used. Attempts are to be made to extend the pressure range form 10 to 100 Kbar.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0008, DEVELOPMENT OF BINDERS FOR EXPLOSIVES AND PROPELLANTS

D.L. ROSS, Stanford Research Institute, *Menlo Park, California* 94025 (N00017-73-C-4329)

Develop binders for explosives and propellants such that they can be readily decomposed and separated into their constituents for reuse.

Synthesize polymers whose cross links are stable at service conditions but are broken by elevated temperature, thus forming a polymer having less resistance to physical or chemical processing.

Supporting agency address information: Naval Ordnance Systems Command 0332B, Washington, D.C. 20360.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0009, WEAPONRY - IGNITION AND COMBUSTION CHEMISTRY OF SOLID PROPELLANTS

H. WISE, Stanford Research Institute, *Menlo Park, California* 94025 (N00014-70-C-0155)

Much development work by navy and other military agencies is devoted to advancing the technology of solid propellant rockets. At present, the preferred solid propellant oxidizer is ammonium perchlorate, AP, and therefore the details of AP chemical reaction kinetics help lay the basis for determination of burning rates, choice of binders, catalysts, and other factors necessary for the development of safe and efficient solid propellants. Accordingly, the objective of this work is to contribute basic information on chemical processes within the temperature and pressure regimes relevant to propellant combustion.

Chemical kinetic processes involved in the combustion of solid propellants are invesigated in detail emphasizing rates of heat release in the condensed phase during burning, the mechanism of AP decomposition as affected by catalysts, and ignition characteristics of AP containing compositions. The developed opposed heterogeneous reactor and flame model have shown the importance of heterogeneously catalyzed reactions in solid propellant combustion. The continuing effort will emphasize measurement of the surface temperature of the solid during steady-state combustion, the temperature maximum in the observed flame, and the composition and temperature profile in the flame.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0010, MATERIALS SUPPORT TECHNOLOGY - NEW SOLID ELECTROLYTE BATTERY MATERIALS

R.A. HUGGINS, Stanford University, School of Engineering, *Palo Alto, California* 94305 (N00014-67-A-0112-0075)

Power sources are an important component of systems (small electrochemical ones in sensors to large vehicular and stationary plants). Research on solid electrolytes points to improvements in batteries needed for large current drain applications. A revolutionary approach, is a dodium-sulfur cell with liquids in electrode compartments and a sodium beta aluminum electrolyte. This shows good power density and relatively good energy density, but must be operated near 300 degrees C. Problems exist in fabrication of the solid electrolyte. This contract is addressed at materials limitations for this kind of rechargeable battery.

This materials research has two objectives: (1) investigation of oxidation of metallic salt-infiltrated polymeric precursors for fabrication of oxide electrolytes; (2) a search for new alkali metal ion-conducting solid electrolytes and property determination for understanding of relationships between crystal structure and transport properties to permit development of lower operating temperature solid electrolytes. Development of new low-temperature electrode systems for use with solid electrolytes, based on current studies of graphite intercalation compounds continues.

Supporting agency address information: Office of Naval Research 472, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0011, WEAPONRY-STRUCTURAL INTEGRITY ANALYSIS OF FILLED VISCOELASTIC SOLID PROPELLANT TYPE MATERIALS AND STRUCTURES
E.H. LEE, Stanford University, School of Engineering, *Palo Alto, California* 94305 (N00014-67-A-0112-0081)

Aggravated by a rising percentage solid filter content, complexities such as nonlinear viscoelastic response to thermal and mechanical service loadings continue to cause untenable uncertainties in the structural integrity analysis of propellant grains for solid rocket motors. The analytical procedures being formulated by this research are expected to assist in significantly reducing these uncertainties.

The equations of viscoelasticity with thermo-mechanical coupling have been reformulated to deal with prescribed motion boundary conditions, as are likely to arise in the vibration; for example, of a propellant grain transmitted from an aircraft structure. For such boundary conditions, the instabilities due to thermal softening of the material are likely to be less severe. Corresponding variational principles are being developed. Also the application of visco-elastic properties to damping of mechanical equipment is being studied. Formulations of elastic-plastic theory are being compared to assess the best approach for evaluation of solutions to metal deformation problems. The procedure of solution for prescribed force change, and prescribed motion are being studied in detail.

Supporting agency address information: Office of Naval Research 474, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0012, NAVY VEHICLE DESIGN AND CONSTRUCTION - HIGH TEMPERATURE, HIGH STIFFNESS PARTICULATE COMPOSITE MATERIALS
O.D. SHERBY, Stanford University, School of Engineering, *Palo Alto, California* 94305 (N00014-67-A-0112-0021)

This research is aimed at composite materials with improved high temperature strength and stiffness for use in jet engines and airframes. Under investigation are the effects of processing variables on the structure and mechanical properties of particulate composites.

Particulate composites will be produced and tested using a combination of extrusion processing and heat treatment. The role of hard second phase particles in affecting texture will be determined and mechanical properties will be measured at high temperatures. Boron and alumina particles will be incorporated into zinc, copper, or magnesium matrices.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0013, WEAPONRY - BORON NITRIDE MATERIALS FOR
R.L. BELL, Varian Associates Incorporated, *Palo Alto, California* 94304 (N00014-73-C-0235)

The objective of this work is to characterize the electrical properties of boron nitride semiconductors in order to determine their suitability for use in the extremely high frequency microwave spectrum demanded of weaponry electromagnetics.

Single crystalline films of the hexagonal form of boron nitride semiconductor will be grown by heteroepitaxy on suitable substrates. The fundamental electrical properties (e.g. saturated carrier velocity and mobility) will be measured and the material usefulness projected.

Supporting agency address information: Office of Naval Research 463, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0014, SYNTHETIC AND REACTION MECHANISM STUDIES WITH BORON HYDRIDES AND CARBORANES 3763-C
M.F. HAWTHORNE, Univ. of California, School of Letters, *Riverside, California* 95606 (DA-ARO(D)-31-124-72-G63)

To elucidate the recent discovery of the polyhedral expansion reaction. The materials to be prepared in this research, exhibit an extremely broad spectrum of chemical and physical properties. Materials containing polyhedral units have been found to act as burning rate catalysts in solid propellants and possess high energy to weight ratios. They have been incorporated into polymers resulting in superior high temperature elastomers and coatings.

Approach - this work will include reaction mechanism and synthetic studies with the higher boron hydrides and carboranes. Transition metal-carborane derivatives will be studied in depth.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706.

SUPPORTED BY U.S. Dept. of Defense - Army

3.0015, INVESTIGATION OF ORGANIC MATRIX MATERIALS FOR HIGH TEMPERATURE COMPOSITIES
W.G. SCHECK, General Dynamics Corporation, *San Diego, California* 92112 (N00019-74-C-0353)

To select an organic matrix for use in aircraft composite structure operating at 450 degrees F or higher.

Screen prospective resins for thermal, oxidative, and hydrolytic stability, mechanical and physical properties, processability and cost. Determine methods of preparing and processing these resins with selected graphite fiber reinforcements.

Supporting agency address information: Naval Air Systems Command 52032D, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0016, HIGH TEMPERATURE COMPOSITE CANARD FOR VTOL FIGHTER
W.F. WENNHOLD, General Dynamics Corporation, *San Diego, California* 92112 (N62269-73-C-0757)

To develop design and fabrication methods for utilizing advanced composite materials in primary structural components for elevated temperature applications on navy high performance vehicles. Achievement of this objective will determine the applicability and effectiveness, in terms of weight savings and cost advantages of using these new materials for future vehicles. A weight savings of about 20 percent over conventional material is anticipated.

The component selected for development is the canard of an advanced V/STOL fighter. The canard is representative of a typical high performance fighter component and will be designed as flightworthy hardware. Two elevated temperature material systems will be evaluated-- graphite/polyimide (G/PI) and boron-aluminum (B/Al). The first phase of this effort will develop the design, analysis and a manufacturing plan for the canard fabricated from each of the two materials systems will be considered. The second phase will resolve some of the problems identified in phase I through the design, fabrication and test of subcomponents.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 30331, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0017, EFFECT OF ADHESIVE PROPERTIES ON THE FATIGUE STRENGTH OF BONDED SANDWICH STRUCTURES
K.R. BERG, Whittaker Corporation, *San Diego, California* 92123 (N62269-72-C-0765)

To determine the effect of adhesive mechanical properties on the strength of bonded sandwich structures under cyclic (fatigue) loading, and to provide the analytical methods necessary for the analysis and design of such structures.

A combined theoretical and experimental investigation which will extend the previous analysis of static and time-dependent loading of bonded sandwich construction to include cyclic loading and fatigue effects. Possible resonance effects due to cycling frequency will be considered, as will possible viscoelasticity/fatigue, and a test program will be performed to substantiate the theoretical results, and the experimental data will be correlated with the analytical predictions.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 30332, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0018, INVESTIGATION OF REINFORCED PLASTICS FOR NAVAL AIRCRAFT ELECTROMAGNETIC WINDOWS
V.A. CHASE, Whittaker Corporation, *San Diego, California* 92123 (N00019-74-C-0055)

To develop composites with improved performance capabilities for use in electromagnetic windows at frequencies up to 35 GHz.

Investigate polybutadiene and two other promising polymers as matrix materials. Improve these polymers by purification or copolymerization with reactive monomers. Evaluate PRD-49 ANS silica reinforcements for use with the above polymers. Recommend fiber treatments, where necessary, to optimize composite properties. Establish optimum fabricating and processing condition for the most promising composite materials.

Supporting agency address information: Naval Air Systems Command 52032D, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0019, ENERGY CONVERSION - STUDIES OF POROUS ELECTRODES FOR RECHARGEABLE BATTERIES
T. KATAN, Lockheed Missiles & Space Co., *Sunnyvale, California* 94088 (N00014-73-C-0397)

The Navy needs portable power sources for many applications including communications and ordnance. It is the purpose of this research to determine the characteristic modes of failure and effects on electrode performance when battery electrodes are operated in typical discharge-charge cycles.

Collections of small, silver spheres will be used as electrodes in experiments designed to test the effects on electrode performance caused by changing specific surface area and effective pore size of the electrodes. This 'sphere-bed' electrode has the advantages that its geometry is well defined, simple, and reproducible. Silver spheres were selected because the electrochemistry of the Ag/AgCl system is convenient for study and is also representative of other cathode structures used in rechargeable batteries.

Supporting agency address information: Office of Naval Research 472, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0020, STABLE ZINC ELECTRODES AND INORGANIC SEPARATORS
B.S. BAKER, Energy Res. Corporation, *Bethel, Connecticut* 06801 (N00024-73-C-5346)

Develop stable long life zinc electrodes and inorganic separators for use in submarine type silver-zinc batteries.

The development program is divided into phases for evaluation and characterization of separators and electrodes, fabrication of experimental cells, testing of cells and analysis of the data and components after the cycling tests are completed.

Supporting agency address information: Naval Ship Engineering Center 6157D, Hyattsville, Md. 20782.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0021, WEAPONRY - STRESS AND STRAIN MEASUREMENT IN SOLID PROPELLANTS AND OTHER NAVAL STRUCTURES
A.J. DURELLI, Catholic University of America, School of Engineering, *Washington, District of Columbia* 20017 (N00014-67-A-0377-0011)

The objectives of this research program are to develop advanced photoelastic laser techniques and experimental stress methods for complex structural systems. The developments in dynamic photoelasticity and holography have important applications in the design of structures able to withstand earthquakes and shocks. The gravitational studies have application in the design of high acceleration rockets and in the designs of dams. The studies conducted on composite materials can be applied to the design of rocket motor cases, as well as to the design of reinforced rocket fuel.

Research currently underway: It has been shown in an analysis of the Fraunhofer diffraction pattern of two superposed gratings by the methods of Fourier optics that the different moire patterns can be separately observed by spatial-filtering techniques. Examples of additive and subtractive Moire patterns obtained individually over the whole field of two superposed gratings have been presented. Using this method the whole field of cartesian shears and rigid rotations has been experimentally obtained. The method has been applied to a circular ring subjected to diametral compression.

Supporting agency address information: Office of Naval Research 474, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0022, NAVY VEHICLE DESIGN AND CONSTRUCTION - FATIGUE, FRACTURE, AND RELIABILITY OF STRUCTURES AND STRUCTURAL MATERIALS
A.M. FREUDENTHAL, George Washington University, School of Engineering, *Washington, District of Columbia* 20037 (N00014-67-A-0214-0011)

The pressing requirement for higher structural reliability in aircraft and other high performance weapon systems makes, of vital importance to the military services, the development of an adequate understanding of fatigue, and a capability to dependably predict fatigue-based service life. This effort is expected to significantly advance both of these objectives.

The experimental research currently underway is concerned with the basic fatigue mechanism in high-strength steels HY 130 and HY 180 at normal frequencies and variable strain-amplitudes (1700 RPM). Axial extension accompanying torsional shear cycling (Ronay effects) is being studied with the purpose of developing a new, very sensitive procedure of rapid evaluation of fatigue performance. The research effort in reliability concentrates on further development of procedures for the contemplated reduction to practice' effort of AFML, particularly with respect to the 'minimum life' concept.

Supporting agency address information: Office of Naval Research 474, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0023, CHEMICAL REACTION RATE CONSTANTS EVALUATION FOR ROCKET PROPELLANTS
D. GARVIN, U.S. Dept. of Commerce, *Washington, District of Columbia*

To evaluate reaction rate data for the gas phase reactions of light molecules, particularly those of interest in combustion systems for propellants used in rocket motors and guns, and the distribution of information on rate data to the technical community. The scope of the project includes information from the fields of photo chemistry and radiation chemistry as well as that of chemical kinetics.

Evaluate rate data on the gas phase reactions of atoms, free radicals, and light molecules such as H, O, HO2, SO2, and SO3. Data sheets developed will ensure ease of updating as new data becomes available.

Supporting agency address information: Naval Ordnance Systems Command 0331B, Washington, D.C. 20360.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0024, METALLURGICAL INVESTIGATION OF CORROSION AND STRESS OF NAVAL AIRCRAFT STRUCTURES
W.F. GERHOLD, U.S. Dept. of Commerce, Natl. Bureau of Standards, *Washington, District of Columbia* 20234

Evaluate corrosion and stress corrosion behavior of materials and material treatments used on naval aircraft components.

In problems concerned with corrosion behavior, comprehensive laboratory and/or extended exposure tests are employed. The effects of various environments (chemical and atmospheric) are determined through precise linear and gravimetric measurements and the analysis of corrosion products.

Supporting agency address information: Naval Air Systems Command 52031C, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0025, MATERIALS SUPPORT TECHNOLOGY - MICROSTRUCTURE-PROPERTY RELATIONS IN GLASSES
J.H. SIMMONS, U.S. Dept. of Commerce, Materials Research Institute, *Washington, District of Columbia* 20034

Development and improvement of glasses with controlled, optimized engineering properties is necessary for advancing performance and reliability in applications such as infrared transmitting windows, optical components, fibre optic waveguides and undersea window components. The overall goal of this contract will be to control physical properties of important technological glasses by understanding microstructural development in them.

Diffusion kinetics will be determined in borosilicate glasses during phase separation. The effect of microstructure on viscous flow will be analyzed as to effects of supercritical fluctuation, water release, and annealing times. Variation of expansion coefficient with microstructure will be measured. This will be applied to a theoretical analysis of how a glassy material releases stresses and anneals. Chemical durability experiments and scanning electron microscopy of corroded specimens will be completed.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0026, MATERIALS SUPPORT TECHNOLOGY - FRICTION AND WEAR OF CERAMICS
S.M. WIEDERHORN, U.S. Dept. of Commerce, Materials Research Institute, *Washington, District of Columbia* 20034

Naval interest in bearings is strong because of their potential application in turbomachinery, aircraft structures and engines. Ceramics are attractive materials candidates for such uses because of their high temperature dimensional stability, corrosion erosion and abrasion resistance and the capability of their being machined to high degrees of surface smoothness. This research effort will generate information on friction and wear of alumina. Relationships between friction coefficients, wear rates, surface damage and environment will be used to define wear process phenomena for this material.

Understanding of wear processes for single crystal alumina will be developed by studying frictional coefficients, wear rates, surface damage, and effects of chemical environments, load and substrate velocity. Transmission electron microscopy will be used to study subsurface plastic deformation in single crystal (normal and precipitation and/or solution hardened) sapphire. Alumina, steel and glass plate will be rubbed against the specimens (sapphire or polycrystalline alumina). Chemical reactions between rubbing surfaces will be investigated. Flow and fracture processes will be monitored via SEM. Chemical environments to be used include air, water, normal alkanes and normal alcohols.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0027, SOLVOLYTIC DEGRADATION OF POLYMERIC BINDERS
G.B. BUTLER, Univ. of Florida, School of Arts, *Gainesville, Florida* 32601 (N00017-73-C-4332)

Degrade binders by solvolysis reactions so that the constituents of propellants can be recovered.

The rate of degradation of typical binders will be measured in various kinds of solvents both with and without catalysts.

Supporting agency address information: Naval Ordnance Systems Command 0332B, Washington, D.C. 20360.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0028, ENERGY CONVERSION - REACTION INTERMEDIATES IN CHEMICAL PROPULSION PROCESSES
M. KAUFMAN, Emory University, School of Arts, *Atlanta, Georgia* 30322 (N00014-73-C-0219)

There is a broad need in Navy and military related combustion technology for more precise chemical kinetic descriptions of burning, detonation, and plasma production processes at high temperatures. This fundamental research on transient species supports technological developments in hydrocarbon combustion for engines, chemical rocket propulsion, MHD power generation and other problems of direct Navy interest, such as chemical lasers.

Although the mass spectrometer has proven itself for the study of kinetics of fast gas reactions, there are some uncertainties inherent in its direct use. These uncertainties arise from the events and conditions imposed upon the molecular species by initiating the reaction, sampling, and ionizing the sampled material for observation in the mass spectrometer. This investigator is developing molecular beam techniques coupled with the mass spectrometer to overcome present difficulties, particularly as they interfere with the monitoring of free radicals in a reaction. By forming a molecular beam from a reaction source and arranging the sampling, free radicals and other transient species can be preserved for subsequent identification. The (sample) molecular beam can also be velocity selected, subjected to magnetic deflection, and additionally subjected to electric field deflection. In this way, valid inferences on the weight, charge, and magnetic moment of the species can be derived.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0029, MATERIALS SUPPORT TECHNOLOGY - PRESSURE AND TEMPERATURE EFFECTS ON ELASTIC PROPERTIES OF SILICATE GLASSES
M.H. MANGHNANI, Univ. of Hawaii, Hawaii Inst. of Geophysics, *Honolulu, Hawaii* 96822 (N00014-67-A-0387-0012)

Materials with improved physical properties (e.g., mechanical behavior) are needed for present uses (e.g., optical components, IR windows) or for possible future systems (e.g., as a structural material for deep ocean use). Glasses are needed for such applications because of their optical properties as well as their high strength-to-weight and stiffness-to-weight values. This research is being performed to provide data on factors controlling mechanical and elastic properties of glasses which will aid in improvement of designs with glasses.

Relationship among elastic, thermal and vibrational properties of M20-Si02, Na20-Ti02-Si02 will be further investigated and compared with those for fuzed Si02, BEf2 and Ge02. Study of the effects of phase separation on glass properties (elastic and IR) in M20-Si02 systems will continue. The low-temperature pressure dependence of the elastic moduli will be studied to derive heat capacity information. Work on ultrasonic attenuation in M20-Si02 glasses continues in order to understand anelastic phenomena related to relaxation times in glasses.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0030, WEAPONRY - SYNTHESIS OF COMPOUNDS CONTAINING NITROGEN, OXYGEN AND FLUORINE RELATED TO CHEMICAL PROPELLANTS
J.M. SHREEVE, Univ. of Idaho, Graduate School, *Moscow, Idaho* 83843 (N00014-71-C-0153)

New and improved materials for rocket propellants and propulsion related materials are needed for Navy missiles. This contract seeks chemical knowledge leading to the preparation of new fluorine compounds for such applications.

Various types of new fluorine compounds are being sought by both conventional and novel methods. The compounds prepared are isolated, identified and their chemistry further developed. Fluorinated peroxides, especially those deriveable from hydrogen peroxide, are being emphasized in current studies, studies on reactions of fluorine containing free radicals, such as the fluorosulfate radical, are to be continued. Various physical methods are being used for studying the composition and structure of new molecules produced. These include chemical ionization mass spectrometry, nuclear magnetic resonance, and laser raman spectrometry.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0031, FRICTIONAL WEAR MECHANISMS - MACHINERY WEAR TECHNOLOGY
R.A. BURTON, Northwestern University, School of Technology, *Evanston, Illinois* 60201 (N00014-67-A-0356-0022)

To investigate the effects of localized heat conductivity, temperatures, and pressures on wear mechanisms which take place between solid materials in sliding contact. The investigations include the effects of thin liquid surface films and surface features such as non- flatness, asperities, and patches of contact. These investigations will lead to an improved understanding of wear mechanisms with subsequent improvement in naval machinery design and performance.

Analytical models of wear mechanisms are being developed which account for the parameters and surface features stated above. Experimental data are being acquired which include the measurements of pressures, temperatures, rotational speed and torque for 3 inch diameter metal-glass surface contacts.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0032, WEAPONRY - INVESTIGATION OF METAL AND METAL OXIDE CLUSTERS
G.D. STEIN, Northwestern University, School of Technology, *Evanston, Illinois* 60201 (N00014-67-A-0356-0027)

The formation of clusters and the subsequent nucleation and condensation of metal and oxide vapors are directly related to a wide variety of Navy applications, especially missile propulsion and power generation. The phenomena are involved in metal combustion, nozzle flow processes, plume detection and reentry phenomena. It also is directly related to liquid metal magnetohydrodynamic energy coversion.

The research to be conducted will be utilizing a combination of several techniques to obtain information on the rate and mechanism of condensation of metals and metal oxides. Both oven and nozzle beams will be used as sources for the metal vapor. In the case of oxides, either their direct vaporization from a film or other source or their formation by reaction between vapor and oxygen will be used. To measure the particle size, a high energy electron diffraction technique will be used for clusters of 10 to 100 atoms. For smaller clusters an electron scintillator-photomultiplier-pulse counting-beam modulation arrangement will be used. The former has been applied to studies now being conducted by the investigator on carbon dioxide nucleation. The results of the experiments will be compared with current theories of condensation and may help resolve some of the differences. Initial studies will be on aluminum and its oxides.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0033, NAVY VEHICLE DESIGN AND CONSTRUCTION - MECHANISMS OF HYDROGEN EMBRITTLEMENT IN METALS AND ALLOYS USED IN NAVAL STRUCTURES
H.K. BIRNBAUM, Univ. of Illinois, School of Engineering, *Urbana, Illinois* 61801 (N00014-67-A-0305-0020)

This research undertakes to clarify the mechanisms by which hydrogen can embrittle metals and alloys, such as those used for Naval aircraft and ship structures.

Crack initiation and propagation mechanisms in niobium-hydrogen, iron-hydrogen and titanium-hydrogen alloys are being investigated. Temperatures and hydrogen content are being varied so that cracking may be studied in alloys both with and without the presence of preceiptated hydrides. Acoustic emission techniques are being used to monitor crack growth and, in certain cases, radioactive tracers are being used to determine diffusion characteristics. Third element doping is being studied to determine the effect on hydrogen diffusion rate and crack growth rates.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0034, FRACTURE CONTROL OF ADHESIVE BONDED STRUCTURES IN NAVAL AIRCRAFT
H.T. CORTEN, Univ. of Illinois, School of Engineering, *Urbana, Illinois* 61801 (N00019-73-C-0154)

To study mechanical behavior and failure modes of bonded structures, including critical flaw size, crack extension and mechanical constraint.

Analytical and experimental techniques are developed and used on adhesive joints, model structures and composites. Fracture mechanics theory and classical mechanics techniques are used as well as new theoretical mechanical approaches.

Supporting agency address information: Naval Air Systems Command 52032A, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0035, ELECTROCHEMISTRY OF FUSED SALTS 1486
H.A. LAITENEN, Univ. of Illinois, School of Liberal Arts, *Urbana, Illinois* 61801 (DA-ARO(D)-31-124-72-G11)

Studies in the field of molten salt electrochemistry will be pursued. This research is relevant to Army thermal battery research programs which stem from a requirement for systems which can operate at high spin rates, lower operating temperatures and in smaller volumes. The preparation of new materials of mixed oxidation state may result in substances with useful catalytic and semiconductor properties.

Emphasis will be on characterization of the composition and properties of double chromites of lithium and a divalent metal arising from the electrochemical reduction of chromate in LICL-KCL melts containing divalent. The extension of this family by varying the oxygen- chromium ratio and the nature of the divalent metal will be explored. Other new compounds will be sought by electrochemical reduction of oxychlorides of metals such as vanadium and tungsten.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706.

SUPPORTED BY U.S. Dept. of Defense - Army

3.0036, STUDY OF METHODS TO ENHANCE THE FATIGUE AND CREEP RESISTANCE OF NAVAL AIRCRAFT ALLOYS
M. HERMAN, General Motors Corporation, *Indianapolis, Indiana* 46206 (N00019-72-C-0458)

The objective of this program is to study the effect of prestressing and surface layer stress removal of aircraft metals to achieve a practical improvement in their fatigue and creep resistance.

A. Compressor blades of Ti-6Al-4V will be prestressed by tensile loading followed by surface removal. Fatigue tests will be performed. Metallographic studies to identify the microstructural features related to the improved fatigue behaviors will be made. B. Thin wall test specimens of Mar M247 and in 792 will be prestressed in tensile loading followed by surface removal. Elevated temperature tensile and creep tests will be performed. Progress will be reported at a later date.

Supporting agency address information: Naval Air Systems Command 52031A, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0037, WEAPONRY - COMBUSTION CHARACTERISTICS OF HYDROCARBON-SLURRY FUEL-AIR PROPULSION SYSTEMS
B.A. REESE, Purdue University, School of Mechanical Engin., *Lafayette, Indiana* 47907 (N00014-67-A-0226-0013)

In the aircraft, missile, and space propulsion program of the Navy; this effort is a major attack on the problems associated with slurry fuel-air-combustion. The slurry fueled airbreathing and air-augmented systems offer the possiblity of important advantages for high performance air-to-air and ground-to-air naval missiles.

Preliminary design studies indicate approximately a 20 to 30 percent range advantage for boron over a heavy hydrocarbon fueled system--hence, this effort hopefully will develop information pertinent to decisions involving performance of future Navy tactical and strategic missiles.

The effort is devoted to development of a combustion model for slurry fuel and air mixture systems and determination of ignition and combustion characteristics as functions of air and fuel temperature, combustor pressure, and fuel and air ratios. A 'sudden air dump' type combustor utilizing various slurry fuels is being utilized to study combustion characteristics and to develop a modeling technique.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0038, NAVY VEHICLE DESIGN AND CONSTRUCTION - SINGLE POLYMER COMPOSITES OF HIGH TENSILE MODULI

R.S. PORTER, Univ. of Massachusetts, School of Engineering, *Amherst, Massachusetts* 01002 (N00014-67-A-0230-0011)

Polymeric materials are used by the Navy in widely varying forms and functions. The properties of such materials are sensitive to the chemical arrangement and physical nature of constituent long chain molecules. This research is aimed at the preparation and characterization of unique composites consisting of radically different morphologies of a single polymer. Such composites hold the promise of high tensile moduli, but low cost for use in aircraft windows, impact resistant materials and noise, shock and vibration absorbers.

Polymers will be prepared in which a sizable content of continuous (extended chain) polymer crystals are suspended in a 'normal' amorphous polymer of identical chemical composition. Such one-polymer systems will avoid the classic composite problem of failure at interfaces since the composition is chemically continuous. Because of a high crystal density for chain packing, high density polyethylene will be used in initial preparations of one-polymer composites. Emphasis will be placed on determining relative merits and limits of promising approaches and the development of structure-property relationships in model systems.

Supporting agency address information: Office of Naval Research, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0039, NAVY VEHICLE DESIGN AND CONSTRUCTION - DEFORMATION AND FRACTURE OF DUCTILE METALS

W.A. BACKOFEN, Mass. Inst. of Technology, School of Engineering, *Cambridge, Massachusetts* 02139 (N00014-67-A-0204-0015)

This research investigates the origin and mechanisms of superplasticity, a condition in which metals can be extensively deformed without incurring fracture. Navy interest in superplasticity stems from its possible use in forming complex shapes from metal alloys, for instance in shaping aircraft wing panels from titanium alloys.

The mechanisms of flow in superplastic behavior and creep will be examined in copper-chromium alloys. Threshold stress and diffusion path will be determined from creep experiments on specimens of helical spring design. Important variables include test temperature (600-900C), externally applied stress, and specimen microstructure and composition.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0040, ENERGY CONVERSION - REACTIVITIES OF IONS IN ELECTROCHEMICAL POWER SOURCES

C.G. SWAIN, Mass. Inst. of Technology, Graduate School, *Cambridge, Massachusetts* 02139 (N00014-67-A-0204-0075)

The reactivities of chemical compounds in solution, for example, in liquid electrolytes in some batteries, are dependent upon many variables including the interactions of the reacting molecules with themselves, with the solvent, and with other reactive molecules. It is the purpose of this study to identify and to parareterize independent variables which determine the reactivity of ions in solution with a view toward understanding reactions in batteries and other reactions of interest to the Navy such as those which lead to corrosion.

The reactivities of ions in solution, including metallic and organic cations and halide, nitrate, formate and other anions, will be studied. The effects of different substituent groups on the reactivities of aromatic and aliphatic ions will also be studied. Analyses of the data obtained will be made in order to identify and to separate independent variables which determine reactivities (possibly such variables as the extent of solvation of the reactive ions, their size or chemical structure).

Supporting agency address information: Office of Naval Research 472, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0041, MATERIALS SUPPORT TECHNOLOGY - GRAPHITE FIBERS FOR IMPROVED COMPOSITE MATERIALS

D.R. UHLMANN, Mass. Inst. of Technology, School of Engineering, *Cambridge, Massachusetts* 02139 (N00014-67-A-0204-0065)

Graphite fibers are currently used in the production of high-performance composite materials, but the chemistry of their production from starting materials such as the polymer polyacrylonitrile is only slightly understood. Small differences in reaction conditions during the production of the fibers lead to large differences in properties such as the strength of the final material. It is the purpose of this investigation to study the structural and kinetic features of the transformation processes involved in producing graphite fibers so that their properties can be predicted and improved.

Small angle X-ray scattering, electron microscopy, and X-ray diffraction techniques will be used to study the reactions occurring in the production of graphite fibers from polyacrylonitrile and other polymers. Graphite process conditions will be intercalated with alkali metals, bromine and other elements and compounds to assist in determining the details of the characteristically layered microstructure of the fibers.

Supporting agency address information: Office of Naval Research 472, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0042, MATERIALS SUPPORT TECHNOLOGY - SELF-DIFFUSION IN SILICON NITRIDE AT HIGH TEMPERATURES

T. VASILOS, Avco Corporation, *Lowell, Massachusetts* 01851 (N00014-73-C-0212)

Higher temperature operation of turbomachinery would increase the efficiency of powerplants. New materials such as silicon nitride are needed to achieve such operation because they are: (1) stable in oxidizing environments, (2) thermal shock resistant, and (3) processable. Mass transport data are totally lacking, but are needed for understanding and controlling high temperature properties such as creep, as well as for improving densification (e.g. sintering).

Self-diffusion coefficients for both Si and N in beta Si3N4 will be determined over a wide temperature range (800-1400 degrees C). Established procedures for specimen preparation and analysis are being adapted to silicon nitride. Activation energies and pre-exponential terms for Si and N will be obtained. Post-anneal microstructure examination will be conducted to determine phase chemistry and segregation alterations from diffusion anneals. Correlations will be attempted on information gathered from the various silicon nitride specimens of different character, including ones of high oxygen content.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0043, NAVY VEHICLE DESIGN AND CONSTRUCTION HIGH PERFORMANCE COMPOSITES

R. BUCHDAHL, Monsanto Research Corporation, *St. Louis, Missouri* 63166 (N00014-67-C-0218)

The navy has need for materials with high strength and high stiffness-to-weight ratio for use in ship, aircraft and underwater vehicle structures. Recent developments in composite materials show great promise for use in such structures. It is the purpose of this research to provide a basic understanding of the properties and behavior of composite materials and to develop techniques for processing and fabrication of short fiber composites.

This investigation will: (a) apply the theories of mechanics and fracture mechanisms to fibrous composites (b) study the nature of the matrix-fiber interface (c) make a critical characterization of constituent materials (d) work on processing, fabricating and testing techniques, and (e) characterize components and combinations of materials to provide engineering data and design methodology.

Supporting agency address information: Office of Naval Research 472, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0044, NAVY VEHICLE DESIGN AND CONSTRUCTION - MICRO-CONTINUUM MECHANICS OF NAVAL STRUCTURES AND MATERIALS

A.C. ERINGEN, Princeton University, School of Engineering, *Princeton, New Jersey* 08540 (N00014-67-A-0151-0004)

Many future Navy vehicle structures will utilize particulate-type composite materials, or will be subject to intense focused loadings which induce high rates of strain. Under such conditions the local interactions of the individual elements making up the bodies play a central role. The subject research is expected to provide a more adequate understanding of the micromechanics thus involved.

The stress analysis of filamentary composite plates with several broken fibers, subject to tensile load at infinity is being investigated, to determine the strength properties of such plates. The stress distribution has been obtained around an elliptic hole in a plate of micropolar elastic solid representing composite solids.

Supporting agency address information: Office of Naval Research 439, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0045, NUCLEAR MICROPROBE HYDROGEN DETECTION TECHNIQUE

G.M. PADAWER, Grumman Corporation, *Bethpage, New York* 11714 (N00019-74-C-0176)

To require capability for in-site (non-destructive) detection and analysis of hydrogen at surface of high strength metallic critical aerospace weapons systems parts. Hydrogen plays a major role in the premature failure of such parts in inducing embrittlement and plays a role in the stress corrosion cracking process.

The contractor has established that the lithium-7-hydrogen reaction forms a highly excited state of beryllium-8. The level thus formed de- excites spontaneously and emits a highly energetic, easily distinguishable gamma ray. The contractor refined the technique to establish its applicability to hydrogen embrittlement and stress- corrosion cracking behavior of high strength materials. He established detection sensitivity, probing depth, and depth and area resolution.

Supporting agency address information: Naval Air Systems Command 52031C, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0046, IMPACT RESPONSE CHARACTERISTICS OF POLYMERIC MATERIALS

W.B. HILLIG, General Electric Company, *Schenectady, New York* 12305 (N00019-74-C-0147)

To generate fundamental understanding of the impact response characteristics of polymeric materials to provide some background to current and subsequent efforts to improve ballistic, rain erosion and other impact performance characteristics of polymerics and composites.

The response of polymethyl methacrylate, polycarbonate and epoxy to a range of controlled impact situations (including pendulum and projectile) will be determined and evaluated.

Supporting agency address information: Naval Air Systems Command 52032, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0047, NAVY VEHICLE DESIGN AND CONSTRUCTION - DEFORMATION AND FRACTURE OF COMPOSITE MATERIALS

N.S. STOLOFF, Rensselaer Polytechnic Inst., School of Engineering, *Troy, New York* 12181 (N00014-67-A-0117-0010)

Directionally solidified composite materials can have exceptionally high creep and yield strengths. Such materials may be used eventually in turbine blading to permit higher operating temperatures and efficiencies in jet engines. The investigators will examine the effect of microstructure on mechanical properties and fatigue resistance in several directionally solidified alloys.

The fatigue properties of directionally solidified eutectics will be examined to determine the effects of microstructural refinement and heat treatment. Fatigue crack nucleation and fatigue crack growth will be followed using scanning electron microscopy. The strain-lifetime relationship of cobalt base-tac eutectics in low cycle fatigue will be found for the temperature range from room temperature to 1000 degrees C.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0048, COMMUNICATIONS - GALLIUM NITRIDE MATERIALS

M.A. LITTLEJOHN, Univ. of North Carolina, School of Engineering, *Raleigh, North Carolina* 27600 (N00014-70-A-0120-0004)

This work seeks new semiconductor materials capable of operating in the upper microwave spectrum.

Hetero-epitaxial growth of gallium nitride films will be investigated on various candidate substrates. Organometallic compounds will be used with pyrolysis deposition techniques and R. F. discharge techniques to stimulate growth at substrate temperatures below the nitrogen dissociation temperature of 600 degrees C. Saturated carrier velocities carrier concentrations and mobilities will be determined.

Supporting agency address information: Office of Naval Research 427, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0049, MATERIALS SUPPORT TECHNOLOGY - FLOW AND FRACTURE OF POLYMERS

E. BAER, Case Western Reserve Univ., School of Engineering, *Cleveland, Ohio* 44106 (N00014-67-A-0404-0013)

This research effort will be aimed at characterizing various classes of polymeric materials with respect to their flow and fracture behavior. Polymers are used in a wide variety of Naval applications, including seals, structures, protective coatings and adhesives.

The mechanical behavior of amorphous and crystalline polymers will be examined under imposed hydrostatic pressure. The influence of the pressurizing fluid on the crazing tendency will be pursued in these polymers. Contrasts in mechanical behavior will be evaluated in terms of microstructure by comparing results from ductile and brittle amorphous polymers and crystalline polymers.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0050, MATERIALS SUPPORT TECHNOLOGY - STRENGTH ANALYSIS OF BRITTLE MATERIALS

C.G. BANSAL, Battelle Memorial Institute, *Columbus, Ohio* 43201 (N00014-73-C-0408)

The Navy has been involved in searching for better engineering structural materials. Ceramics have received attention for use in thermally and chemically hostile environments for a range of components including radomes, armor, gas turbine rotors and sta-

tors, rocket nozzles and IR windows. However, it is not now possible to predict satisfactorily from property data, the loading levels that can be safely imposed on brittle structural components. Methods of stress analysis to predict stress conditions in service are well developed. Also needed is a careful description of stress conditions under which the material fails, so that imposed and failure stress conditions can be compared. Relations between important physical variables and observed failure stress levels need to be determined in order to describe and understand strengths adequately for design purposes. This research contract is addressed to this problem. Specific attention will be on specification of the correct relation between size and failure stress for any brittle material. This program also has relevance to laser effects interests.

Materials and specimen control will include processing specifications, quality assurance techniques, and machining specifications. Experimental evaluations will be aimed at critical tests of theories of size dependency on strength (i.e., spurious, skin effect, stored strain energy or statistical). Strengths, moduli and fracture energies will be measured. Size, environment, strain rate and stress distribution will be varied. Precise data determination will be emphasized in order to make a careful analysis of results.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0051, AIRCRAFT JET FUELS - CHEMILUMINESCENCE AND STABILITY

R.A. NATHAN, Battelle Memorial Institute, *Columbus, Ohio* 43201 (N00019-73-C-0360)

Aviation jet fuel is used as a heat transfer medium and, as such, is exposed to high-temperature oxidative conditions during operation of the aircraft. This leads to the formation of materials which deposit on various components of the aircraft fuel system, thereby impairing its normal operation. A program is proposed for the utilization of a chemiluminescence technique to study the kinetics and mechanism of the oxidative degradation of jet fuels. In this case, chemiluminescence refers to the light emitted during the oxidation of hydrocarbons and is a highly sensitive technique easily capable of detecting appropriate reactions on the order of millimoles per year.

Various chemiluminescent properties were studied for pure representative hydrocarbons, in an attempt to better understand the oxidation to identify parameters useful for predicting jet fuel stability.

Supporting agency address information: Naval Air Systems Command 310C, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0052, RESEARCH STUDY OF HYDROCARBON FUELS ON TURBINE BLADES OF NAVAL AIRCRAFT ENGINES

R.M. SCHIRMER, Phillips Petroleum Company, *Bartlesville, Oklahoma* 74004 (N00019-71-C-0486)

Conduct a research program on hydrocarbon fuel to determine the effects of sulfidation of turbine blades on Naval aircraft engines.

Investigate effects of JP-5 turbine fuel controlled chemical composition on the performance of the combustion system. Determine effects on turbine condition and quality of exhaust emission.

Supporting agency address information: Naval Air Systems Command 330C, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0053, MATERIALS SUPPORT TECHNOLOGY - THERMAL CONDUCTIVITY AND DIFFUSIVITY OF ENGINEERING CERAMICS

D.P. HASSELMAN, Lehigh University, Materials Research Center, *Bethlehem, Pennsylvania* 18015 (N00014-67-A-0370-0011)

The Navy has need for components fabricated of ceramics, glasses, or glass-ceramics (e.g., sonar transducers, refractories, radomes, IR domes, bearings, and many others). This research task is aimed at systematically investigating dependence of Thermal Conductivity (TC) and diffusivity of such engineering materials on features of microstructure, defects, and chemical composition. This will aid in improved understanding of effects of character and processing variables on heat transfer mechanisms, which will contribute to successful design applications for these brittle materials, especially when thermal stress fracture under severe transient or steady-state heat transfer is encountered in anticipated service environments.

Only well-characterized materials of simple geometry will be investigated, and will include silicon nitrides, glass-ceramics and aluminas. TC and diffusivity will be measured by the laser-flash method. Temperatures will be remotely sensed, varying from room temperature to melting or softening point regions. The data will be interpreted in theoretical terms for effects of temperature, microstructure, flaws and composition on TC. Trade-offs between improvements in TC and thermal shock resistance will be considered. Cooperative efforts with other laboratories will emphasize measurement of TC of materials characterized elsewhere and direct correlations between TC and other properties with specimens of identical processing history.

Supporting agency address information: Office of Naval Research, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0054, STRENGTH AND FAILURE CRITERIA FOR COMPOSITE AERO STRUCTURES

G.C. SIH, Lehigh University, School of Engineering, *Bethlehem, Pennsylvania* 18015 (N62269-73-C-0743)

To provide understanding of failure mechanisms in fiber reinforced composite laminates. To identify the fundamental physics of the numerous interdependent, composite failure mechanisms. To formulate rational failure criteria based upon predominate interacting failure modes appropriate to various critical loading conditions. To develop analytical procedures, based upon these failure criteria, to predict critical strengths of composite structures.

Apply background knowledge and analytical and mathematical skills to the development of new strength and failure theories for advanced filament reinforced composite materials. These theories will be based upon the fundamental physics of composite failure mechanisms. Analytical continuum and fracture mechanics procedures will be applied to phenomenologically explain and numerically quantitize the various failure mechanisms. Experiments will be designed in light of the developed theory to elucidate and demonstrate the various failure phenomena.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol, Dept. 30332, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0055, WEAPONRY - POLY (METAL PHOSPHINATES) FOR HIGH ENERGY SHIELDING MATERIALS

B.P. BLOCK, Pennwalt Corporation, *Norristown, Pennsylvania* 19406 (N00014-69-C-0122)

Navy developments of the foreseeable future pose complex production problems which may be solved by new types of plastics and rubbery materials with combinations of superior properties, including stability at temperatures beyond the capabilities of known compositions. Examples include coatings, sealants and composite structures for advanced aircraft or reentry bodies. This research has created a versatile family of inorganic polymers based on bound metal atoms. Typically these polymers show high levels of stability and other promising qualities. Objectives of further research are sufficient data and understanding of the effects of chemical modifications on polymer properties to guide required material developments such as atomically dispersed metal- containing high energy shielding structures.

Novel combined metal polymers and related compounds are synthesized and characterized. Properties indicative of utility are determined and correlated with molecular structure. Chemical systems such as poly(metal phosphinates) containing metals of high atomic number and methods for crosslinking to strong network structures will be emphasized.

Supporting agency address information: Office of Naval Research 472, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0056, SURFACE AND MECHANICAL PROPERTIES OF SILICON NITRIDE BEARING ELEMENTS
J.J. MCCOOL, S K F Industries Incorporated, *Norristown, Pennsylvania* 19406 (N00019-74-C-0168)

To determine the effects of composition, including impurities, and of surface finish on the wear resistance of bearing-type silicon nitride. This data will serve to characterize the conditions under which the above ceramic can be used as a substitute for steel bearings in future high speed aircraft turbine engines.

The effect of the state of the silicon nitride surface produced by different finishing parameters on wear resistance and endurance will be evaluated. The pin-on-disc and lapmaster apparati will evaluate changes in friction and wear behavior of silicon nitride with varying impurity (Ca, Fe, W) contents.

Supporting agency address information: Naval Air Systems Command 310C, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0057, NAVY VEHICLE DESIGN AND CONSTRUCTION - DEFORMATION BEHAVIOR OF METAL MATRIX COMPOSITE MATERIALS
A. LAWLEY, Drexel University, School of Engineering, *Philadelphia, Pennsylvania* 19104 (N00014-67-A-0406-0001)

This research effort is directed towards increasing our understanding of how interfacial structure affects mechanical properties of composite materials. The researchers will examine the effects of elevated temperature on the structure and properties of metal-matrix composites. The work is aimed primarily at future applications of composites in hot sections of jet engines.

The investigators will examine the effects of high temperature exposure on structure and mechanical properties of filament-reinforced composites (nichrome matrix with tungsten filaments) and directionally- solidified eutectic composites based on the cobalt-chromium-carbon system. Thermal stability, including thermal cycling, will be followed in both types of composites and such factors as structural coarsening and diffusion-barrier interfaces examined. Forging of composites will be attempted to determine the variables which influence their formability.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0058, ENERGY CONVERSION - STUDIES OF POROUS ELECTRODES BY NON-DESTRUCTIVE TECHNIQUES
L. NANIS, Univ. of Pennsylvania, School of Engineering, *Philadelphia, Pennsylvania* 19104 (N00014-67-A-0216-0030)

Porous electrodes are used in batteries to provide large, reactive surface areas and thereby to increase the efficiency of battery operation. It is proposed to study porous battery electrodes by a novel, rapid, and non-destructive technique, to provide information which will lead to improved batteries for Naval applications.

Studies of porous cadmium electrodes in alkaline electrolytes have shown a connection between passivation, measured on the front surface of the electrode, and changes in diffuse reflectance from the rear surface. It is proposed to use the diffuse reflectance technique to study non- destructively correlations between discharged profiles within battery electrodes and factors such as current density, temperature, and electrode porosity.

Supporting agency address information: Office of Naval Research 472, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0059, WEAPONRY - STRUCTURE OF HIGH TEMPERATURE MOLECULES RELATED TO PROPULSION
D. WHITE, Univ. of Pennsylvania, School of Arts, *Philadelphia, Pennsylvania* 19104 (N00014-67-A-0216-0001)

To support (Navy) rocket propellant technology in predicting performance of various combinations of fuels and oxidizers. This requires determination of reaction course (stability relationships) and the calculation of energy release using thermodynamic data which is being acquired by this research. Compounds investigated are selected on the basis of relevance to future Navy rocket propulsion goals.

Research is done on molecules existing at high temperatures using mass spectroscopy for identification and subsequent infrared spectroscopy for determination of structural features and estimation of thermochemical data. Chemical reactivity and stability relationships between similar molecules are examined over temperature ranges of interest. Use of matrix trapping and the availability of a high resolution spectrophotometer provide powerful attack on this problem. Currently, theoretical work on the effects of matrix versus trapped molecules interaction is in progress. Systems investigated are chosen on basis of relevance to chemical rocket propulsion and include the oxides, hydroxides, and borates of elements of the first two groups-Li, Na, K, Be, Mg, etc.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0060, NAVY VEHICLE DESIGN AND CONSTRUCTION - FORMATION OF PROTECTIVE COATINGS ON METAL ALLOYS AND COMPOSITE MATERIALS
R.W. HECKEL, Carnegie Mellon University, School of Engineering, *Pittsburgh, Pennsylvania* 15213 (N00014-67-A-0314-0017)

The major aim of this research is to learn how protective coatings form on metal alloys so that better control may be exercised during the coating process. The closely related problem of thermal degradation of composite materials at high temperatures will be investigated in parallel with the above study. The research results could be employed in many areas including coating components for gas turbine engines and composite-material turbine blades.

The formation and degradation of aluminide coatings on nickel alloys will be analyzed to develop a computerized model of the coating process and experimental data to be used in verifying the model. High temperature degradation of Al-B, Al-Borsic, and Ni-W composites will be analyzed and formation of protective coatings at the fiberbinder interface will be attempted.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0061, CHEMICAL REACTIONS AND RECOMBINATIONS IN SHOCK WAVES 4047-C 4047
H.B. PALMER, Penn. State University, School of Earth Sciences, *University Park, Pennsylvania* 16802 (DA-ARO(D)-31-124-72-G85)

To extend the knowledge of chemical reaction in shock tubes. The investigation of chemical decomposition processes at temperatures and pressures occurring in shock waves is of value in clarifying the ignition and combustion processes of explosives, fuels, and propellants utilized by the Army and the Department of Defense.

Approach - Studies already in progress on (a) hydrazinedecomposition kinetics as determined by the single-pulse shock tube technique, and (b) radiative recombination of halogen atoms, will be completed. The work will then be extended to ammonia decomposition and the radiative recombination reaction, O plus NO yields NO2 plus photons.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706.

SUPPORTED BY U.S. Dept. of Defense - Army

3.0062, NAVY ENVIRONMENT - ENVIRONMENTAL EFFECTS, AGING AND CORROSION ON SURFACES OF CERAMICS AND GLASSES
K. VEDAM, Penn. State University, Materials Research Laboratory, *University Park, Pennsylvania* 16802 (N00014-67-A-0385-0018)

Applications of ceramics and glasses include uses such as transparencies, optical components, turbine parts and sonar

transducers. This work is a study of deterioration of these materials in corrosive and damaging environments, and is part of a program on optimization of mechanical behavior, durability and reliability of glasses and ceramics used in Naval systems. The goal of this work is to understand the first stages of surface damage and corrosion on ceramic and glassy surfaces via ellipsometric and soft X-ray spectroscopic methods.

Ellipsometry and soft X-ray spectroscopy are being used to study corrosion and surface damage on glasses ceramics nondestructively. Surface layers in the 100 Angstrom range are being studied as to chemical composition and variation with depth, frozen-in strain, and coordination of elements in favorable cases. Ellipsometric methods are to be automated and applied to characterization of surfaces in the system spinel-silica, Si3N4-SiO2-air (for oxidation behavior), glasses in alcohols (applied to surface finishing mechanisms) and tempered glasses (for determination strain frozen in surface layers). The influence of surface roughness of real ceramics and glasses on ellipsometric parameters is being determined for differently polished samples.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0063, MATERIALS SUPPORT TECHNOLOGY - CHARACTERIZATION OF MICROSTRUCTURAL VARIABILITY IN PROCESSING OF CERAMICS

E.W. WHITE, Penn. State University, Materials Research Laboratory, *University Park, Pennsylvania* 16802 (N00014-67-A-0385-0019)

Ceramics are used in Naval systems because of their unique electrical, mechanical or thermal properties (e.g., sonar transducers, reentry shields, gyro bearings). Low reliability and reproducibility levels of materials under in-service environments block improvements. This is undesirable and is related to unknown and uncontrolled microstructure development in processing steps. This work concentrates on development and use of Scanning Electron Microscope-Computer (SEM-C) techniques for characterizing microstructures and surfaces as they develop or change.

Quantitative (SEM-C) characterization of microstructures continues. Polished and etched sections, fractured and finished surfaces of aluminas, silicon nitride and graphite are being investigated. Details for aggregates and deagglomerated particulate dispersions and ultimate particle sizes are being characterized. Computer processed transmission SEM will be used in this. This allows 3D descriptions of materials to be mapped, including shapes of real grains and how shapes vary with grain size. These will be compared with commonly used models from 2D results. Quantitative automated petrography on polished and etched sections will be used for grain size, shape and orientation.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0064, MATERIALS SUPPORT TECHNOLOGY - CERAMIC MATERIALS FOR HIGH TEMPERATURE BEARINGS

P.J. GIELISSE, Univ. of Rhode Island, School of Engineering, *Kingston, Rhode Island* 02881 (N00014-68-A-0215-0008)

Naval interest in gas bearings has developed because of their application in guidance system components, engines and machinery, and data processing systems. Ceramics are attractive materials candidates for such uses because of their high temperature dimensional stability, high stiffness levels, corrosion, erosion and abrasion resistance and the capability of their being machined to high degrees of surface smoothness. This research on fundamental wear mechanisms and frictional behavior of ceramics at high temperatures and mechanical loading is needed to advance design and performance of high temperature gas bearings.

Research is in progress on systematic analysis of friction and wear behavior of ceramics in high speed sliding contact. Materials included are silicon nitride, silicon carbide, boron carbide, silicon oxynitride and chromic oxide. Loads will be up to 20 psi and speeds will be up to 300 inches per second. Microstructure and surface character will be related to wear and impact loading.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0065, MATERIALS SUPPORT TECHNOLOGY - PROPERTIES OF CONDENSED IONIC SYSTEMS

W.M. RISEN, Brown University, Graduate School, *Providence, Rhode Island* 02912 (N00014-67-A-0191-0024)

Sea water, battery fluids, ionic glasses and many other systems contain charged particles (ions) in high concentrations. These ions, which interact strongly with each other, are responsible for many of the unusual and unpredictable properties of such systems. For example, the electrical conductivity of ionic solutions (a property of importance in battery design) behaves differently at high and at low ionic concentrations. It is the purpose of this study to investigate the interactions of ions in condensed phase systems in order to understand and to predict the properties of sea water, battery fluids and other ionic systems of interest to the Navy.

Ionic interactions are being studied in condensed-phase systems such as ionic oxide glasses, ionic organic copolymers, and ion-enclosure complexes (e.g., ion-sieves) by various spectroscopic techniques including infrared, laser raman, and ESCA (Electron Spectroscopy for Chemical Analysis). The purpose of these studies is to relate molecular- level interactions and bulk physical properties of these materials, with particular reference to their transport, mechanical, phase- transformation, and kinetic properties.

Supporting agency address information: Office of Naval Research 472, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0066, NAVY VEHICLE DESIGN AND CONSTRUCTION - THERMAL FATIGUE OF METAL MATRIX COMPOSITE MATERIALS

M.A. WRIGHT, Univ. of Tennessee, Space Institute, *Tullahoma, Tennessee* 37388 (N00014-71-A-0121-0003)

Thermal fatigue is an important factor to consider in many potential Navy applications of composite materials, such as in components for jet engines and high speed aircraft skins. Thermal fatigue is a result of imposed, varying strains due to the differential thermal expansions of the composite binder and reinforcement as temperature fluctuations occur. In this research thermal fatigue mechanism will be investigated in candidate metal matrix composite materials.

The first phase of the research emphasizes temperature fluctuations occurring between ambient and elevated temperatures; the second phase covers ambient to low temperatures. Filament-reinforced and directionally-solidified, eutectic composites will be examined, and changes in composite structure resulting from the thermal cycling will be noted and correlated with mechanical properties. Important variables include temperature, imposed load, binder and fiber type, and fiber volume percent.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0067, CHEMICAL REACTIONS IN SHOCK WAVES 3390

W.C. GARDINER, Univ. of Texas, School of Arts, *Austin, Texas* 78712 (DA-ARO(D)-31-124-71-G121)

To study the reaction kinetics of high temperature gas phase reactions. The Army has a considerable need for obtaining additional knowledge of the reaction kinetics of materials such as explosives, fuels, and propellants which are fundamental to Army systems involving ignition, combustion and propulsion. This project should produce the data leading to this kind of knowledge.

Approach - studies will include the high temperature oxidation of hydrogen and of acetylene in shock waves.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706.

SUPPORTED BY U.S. Dept. of Defense - Army

3.0068, MATERIALS SUPPORT TECHNOLOGY - NEW ELECTRICALLY CONDUCTING POLYMERS
M. TSUTSUI, Texas A & M University System, School of Science, *College Station, Texas* 77843 (N00014-68-A-0308-0006)

It is proposed to prepare and to characterize polymers which have appreciable conductivity along a metal chain axis in order to provide materials of potential use to the Navy for electronic components.

Bimetalloporphyrins have been prepared from rhenium hexacarbonyl to produce a complex in which the metal-metal bond is shorter than in the normal state. Reaction of this material with an equimolar amount of neutral porphyrin should result in a 'shish-kabob' type polymer with rhenium atoms as the skewer and porphyrin rings as the skewered material. Similar type materials should be possible by using other metal carbonyls and varying the substituents on the porphyrin ring. The spacial structure of the precursor materials and the polymer will be determined by X-ray techniques. Physical and chemical properties, including electrical properties and the susceptibility to degradation, will be determined.

Supporting agency address information: Office of Naval Research 472, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0069, NAVY VEHICLE DESIGN AND CONSTRUCTION - STABILITY OF BILINEAR STRUCTURES
R.M. JONES, Southern Methodist University, School of Engineering, *Dallas, Texas* 75222 (N00014-72-A-0296-0002)

Development of new composite materials with high strength to weight ratio could be used in missile and aircraft structural components. The elastic moduli of these materials in tension and compression are different and the predictive tools for the response of structural elements made of composites need great improvement to increase their possible use in Naval structural systems.

The investigator will consider the systematic characterization of composite materials, the establishment of a consistent material model to be used in analytical predictions involving bilinear materials, and the application of this model to thermal stress and instability problems.

Supporting agency address information: Office of Naval Research 474, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0070, MATERIALS SUPPORT TECHNOLOGY - PREPARATION OF CHALCOGENIDE GLASSES
A.R. HILTON, Texas Instruments Incorporated, *Dallas, Texas* 75222 (N00014-73-C-0367)

The optical quality of chalcogenide glasses processed by present methods is sufficient to meet most present needs of conventional avionics systems. Great improvement in overall quality is needed before their use for high energy laser windows or high resolution avionics components become possible. Quality improvement through changes in methods of compounding and casting is being attempted. Understanding gained is to be applied to development of new glasses better suited (reduced bulk absorption, elimination of striae) for IR transparencies.

Process changes to substantially improve optical quality of selenium-based chalcogenide glasses are to be implemented to produce glass plates large enough for characterization and evaluation. Absorption at 10.6 micrometers, glass temperature, thermal conductivity, strength, hardness coefficient of expansion and change in refractive index with temperature. Modification of properties by sulfur addition will be tried.

Supporting agency address information: Office of Naval Research 471, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0071, THE OPTICAL PROPERTIES OF MATERIALS-ELECTRODE PROCESSES- AND ENZYME REACTIONS 3383-C
H. EYRING, Univ. of Utah, School of Letters, *Salt Lake City, Utah* 84112 (DA-ARO(D)-31-124-72-G15)

To investigate and develop principles useful in selecting and evaluating the usefulness of molecules for special purposes. Relevance- this work is relevant to Army programs involving detonations and in the evaluation of electronic components. There are a number of areas in which the kinetic investigations may have application such as in combustion, fuels, corrosion and technology.

Approach - (1) reaction kinetics - to arrive at generalizations which will assist in predicting the factors affecting specific reaction rate constants, particularly the transmission coefficient. (2) the theory of liquids - to carry out a statistical mechanical study of the properties of pure water as well as solutions of electrolytes and of non-electrolytes. (3) optical rotation - to develop further the theory of optical rotation and to assess the catalytic significance of molecular asymmetry in biological reactions and its influence in organic evolution.

Supporting agency address information: OCRD Research Office Durham, Durham, N.C. 27706.

SUPPORTED BY U.S. Dept. of Defense - Army

3.0072, INVESTIGATION OF REINFORCED THERMOPLASTICS FOR NAVAL AIRCRAFT STRUCTURAL APPLICATIONS
J. HOGGATT, Boeing Company, *Seattle, Washington* 98108 (N00019-74-C-0226)

To evaluate the properties of fiber reinforced thermoplastics for Naval aircraft structural applications.

Develop procedures for impregnation and fabrication of fiber reinforced thermoplastics. Evaluate the mechanical, physical and environmental resistance properties of these composites.

Supporting agency address information: Naval Air Systems Command 52032D, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, NAVY VEHICLE DESIGN AND CONSTRUCTION - AIRBORNE SENSOR DISPLAY CRITERIA
W.L. CAREL, Hughes Aircraft Company, *Culver City, California* 90230 (N00014-72-C-0451)

The prolification of display requirements for modern fighter and low-level attack aircraft forces the integration of information into multiple-function displays. The proper definition of associated display criteria for sensor information is a necessary step to the definition of multifunction, multiformat displays for Army, Navy, and Marine Corps attack aircraft. This effort is part of the Joint Army Navy Aircraft Instrumentation Research (JANAIR) Program.

The task will define display criteria for airborne sensor information for use with multifunction displays. These criteria will result from previous analytical investigations, supplemented by research experiments to establish data not obtained in the prelaboratory effort. These experiments will address optimally matching display parameters to their corresponding sensor parameters, relative to operator performance, and deal with a day/night radar and IR display in a jet attack type aircraft and a night IR display in a helicopter. Display parameters will include modulation transfer functions (MTF) display size, gray shades, and frame rate; ambient illumination, aircraft speed, and aircraft altitude.

Supporting agency address information: Office of Naval Research 461, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0002, MASTER MONITOR DISPLAY FOR FUTURE NAVAL AIRCRAFT
F.G. WOLFSON, Hughes Aircraft Company, *Culver City, California* 90230 (N62269-74-C-0149)

To determine the optimum design characteristic for a master monitor display for the 1980 era aircraft. The MMD is intended to provide the pilot with warning caution, mode advisory, function failure and auxiliary information on a single display surface.

The contractor will provide the necessary supplies and services to conduct an evaluation of advanced technology for a MMD system.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 30421, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0003, DEVELOPMENT OF AN IN-FLIGHT MAINTENANCE MONITORING SYSTEM FOR ROTARY WING AIRCRAFT

A. NAIPO, Teledyne Incorporated, *El Segundo, California* 90245 (N62269-73-C-0584)

To develop a maintenance monitoring system (MMS) for in-flight diagnostics and maintenance monitoring of rotary wing aircraft and to flight demonstrate the MMS in SH-3D helicopters.

To contract with the teledyne controls for the development of their flight data and acquisition system as an in-flight diagnostic and maintenance monitoring system for rotary wing aircraft. The contractor is to adapt and install the equipment in three Navy SH-3D helicopters and assist in equipment calibration and checkout and provide engineering and technical support during flight tests. Navy maintenance and flight personnel are to be trained in the operational use of the equipment. The Navy is to perform normal flight operations of the SH-3D helicopters. Informal monthly progress reports and a final report are to be prepared by the contractor.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 3043A, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0004, COMMUNICATIONS - MAGNETOSPHERIC CHARGED PARTICLE ENTRY

W.P. OLSON, McDonnell Douglas Corporation, *Huntington Beach, California* 92647 (N00014-72-C-0233)

Naval communications, navigation and surveillance systems utilizing the long range propagation of electromagnetic waves require a predictive capability of the condition of the ionosphere. Ionization distribution in the ionosphere controls the long range propagation of these signals. In order to attain this predictive capability an understanding is required of entry of charged particles into the magnetosphere. The penetration of charged particles through the magnetopause must be understood in order to explain the dynamic processes that occur in the magnetosphere (substorms and magnetic storms).

The entry of particles into the magnetotail will be quantitatively studied using the field models developed under this contract. The trajectories of particles incident on the equatorial magnetopause on the tail will be computed from the Lorentz force on the particle. The few particle trajectories that have been run thus far have shown that a class of particles in the tail of the equatorial magnetosheath can easily gain access to the magnetosphere. The region of particle entry into the tail and the extent of the region of parallel momentum transfer to the tail will be quantitatively determined. Other associated parameters will also be computed (e.g., the total parallel momentum, and the energy influx carried by the particles).

Supporting agency address information: Office of Naval Research 427, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0005, COMMUNICATIONS - ELECTROMAGNETIC SIGNAL PROCESSES AND THE IONOSPHERIC PLASMA

B.D. FRIED, Univ. of California, School of Arts, *Los Angeles, California* 90024 (N00014-69-A-0200-4023)

The objective is to carry out research on plasmas and their interaction with electromagnetic fields for application to ballistic missile effects, atomic weapons effects, electromagnetic communications, and energy conversion devices, used in naval operations. Ionization effects in plasmas as related to radio frequency communication and telemetry from surveillance and navigation satellites, plasmas associated with ballistic missile signatures, ionospheric plasma disturbances used in high altitude atomic weapons explosions detection; and the application of magnetic fields to plasmas as a means of directly converting the thermal energy of combustion to electrical power will be studied.

Work will consist of theoretical and numerical studies of nonlinear and collective phenomena in plasmas. Both wave-wave and wave-particle types of nonlinearity will be studied. Low frequency drift wave instabilities will also be examined as they relate to diffusion in containment devices which have been stabilized against high frequency instabilities. Plasma wave echoes will be studied to allow for their use as diagnostic techniques for particle distribution functions and collisions and diffusion processes.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0006, RESEARCH IN VARIATIONAL THEORY AND OPTIMAL CONTROL THEORY 5863-M

M. HESTENES, Univ. of California, School of Letters, *Los Angeles, California* 90024 (DA-ARO(D)-31-124-71-G18)

To increase the knowledge of numerical analysis and calculus of variations. This work is a study of methods of optimal control (methods of controlling a system to make a desired benefit as large as possible or a penalty as small as possible). These methods will be applicable to logistical problems (control of inventory at a storage depot) and physical problems (control of flight path and rate of fuel consumption of an airplane or helicopter to obtain maximum range).

Approach - the theory of quadratic forms in Hilbert space will be the starting point. Studies will include 1 matrix theory of differential equations from the point of view of computation, 2 optimal control problems from both the theoretical and computational points of view, 3 connections with dynamic programming, and 4 multiple integrals and the associated theory of partial differential equations.

Supporting agency address information: OCRD Research Office, Durham, N.C. 27706.

SUPPORTED BY U.S. Dept. of Defense - Army

4.0007, COMMUNICATIONS - IONOSPHERIC TURBULENCE AND MAGNETOSPHERIC-IONOSPHERIC COUPLING FOR EVALUATION OF RADIO COMMUNICATIONS

C.F. KENNEL, Univ. of California, Inst. of Geophys. & Pla. Phys., *Los Angeles, California* 90024 (N00014-69-A-0200-4050)

The objective is to evaluate the effect of the ionosphere on radio communication systems used in Navy operations and to help in the design and operation of such systems. The propagation and attenuation of high- frequency, very low-frequency, and very high-frequency radio signals by the ionosphere, by both ground-based and satellite transmitters, are governed by the electron and ion densities in the ionosphere. The present work develops a model to estimate these electron and ion densities as a function of latitude, longitude, altitude, season, time and solar activity. The work also has applications to the estimation of the effects on ionosphere communications due to high altitude nuclear explosions used, for example, in ballistic missile defense.

Work will consist of investigations of ionosphere plasma turbulence, magnetosphere-ionosphere interactions, and magnetospheric substorms. In particular, the following topics will be considered: the role of photoelectrons in producing F-region irregularities, the viscous coupling of solar wind momentum to the magnetosphere and the associated ionospheric convection electric field and neutral wind pattern, and the saturation of the auroral electrojet instability.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0008, COMMUNICATIONS - TUNABLE INFRARED PARAMETRIC OSCILLATORS
R.L. BYER, Stanford University, School of Humanities, *Palo Alto, California* 94305 (N00014-67-A-0112-0070)

Navy communications will in the future make increasing use of laser technology. Tunable parametric oscillators will contribute substantially to this function.

Methods of narrowing the bandwidth of parametric oscillators will be investigated. Investigation of I2 molecular properties, namely accurate measurement of higher lying vibrational levels, resonant raman and resonant fluorescence scattering, will continue. Molecular mercury will also be examined from the point of possible laser action.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0009, COMMUNICATIONS - PROPERTIES OF THE MAGNETOSPHERE AND IONOSPHERE USING VERY-LOW-FREQUENCY WHISTLER MODE SIGNALS
R.A. HELLIWELL, Stanford University, Stanford Electronics Lab., *Palo Alto, California* 94305 (N00014-67-A-0112-0012)

To obtain fundamental information on the propagation properties of the ionosphere and magnetosphere in order to improve the reliability and efficiency of naval communications.

Radio waves are used for studying propagation through the ionosphere and magnetosphere. This year's effort is directed toward improving the AN/FRA-31 transmitter by extending its range of operation to 0.5-30 KHz and by increasing the efficiency and bandwidth of the simple station installation.

Supporting agency address information: Office of Naval Research 427, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0010, X-BAND STEP RECOVERY DIODE RECEIVER MODULE FOR MISSILE ANTENNA
H.C. PENNER, Teledyne Incorporated, *San Diego, California* 92120 (N00019-74-C-0232)

To develop an x band, low cost, solid state, conformal, semiactive missile seeker. The SRD provides a unique concept in electronic beam steering and can be used as a simultaneous phase shifter and multiplier.

Design, develop and fabricate a 32 element semiactive missile seeker using the x-band step recovery modules designed and built under previous contracts. The x-band receiving modules provide the bais for implementing a semiactive, planar, phased array missile seeker.

Supporting agency address information: Naval Air Systems Command 53322F, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0011, COMMUNICATIONS - HIGH-LATITUDE TOP-SIDE IONOSPHERIC PROCESSES FOR EVALUATION OF RADIO COMMUNICATIONS
P.M. BANKS, Univ. of California, Graduate School, *San Diego, California* 92038 (N00014-69-A-0200-6042)

The objective is to evaluate the effect of the ionosphere on radio communication systems used in Navy operations and to help in the design and operation of such systems. The propagation and attenuation of high- frequency, very low-frequency, and very high-frequency radio signals by the ionosphere, by both ground-based and satellite transmitters, are governed by the electron and ion densities in the ionosphere. The present work develops a model to estimate these electron and ion densities as a function of latitude, longitude, altitude, season, time and solar activity. The work also has applications to the estimation of the effects on ionosphere communications due to high altitude nuclear explosions used, for example, in ballistic missile defense.

The work will develop a model describing the time dependent coupling of the F2-region and topside ionosphere, including supersonic H ion flow and changes in magnetic flux tube volume. Ionic densities and flow velocities for quiet and disturbed regions outside the plasmasphere will be obtained. The role of plasma drifts in establishing global neutral wind patterns within the thermosphere will be assessed.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0012, DESIGN, FABRICATE AND TEST OF ADVANCED DEVELOPMENT ROLLER GEAR TRANSMISSION FOR ARMY AIRCRAFT
L.R. BURROUGHS, United Aircraft Corporation, *Stratford, Connecticut* 06497 (DAAJ02-69-C-0042)

Conduct a program to perform experimental, developmental, or research work to design, fabricate and test a roller gear transmission system in an S-61 type helicopter.

The contractor will perform: A preliminary design trade-off study; a detailed design of all components associated with the installation of the roller gear transmission into an S-61 helicopter; fabricate six (6) roller gear transmissions with spares to support test program; conduct 200-hour bench test; conduct 1,000-hour reliability program; conduct 50- hour ground test in an S-61 helicopter; conduct 25-hour flight demonstration test; prepare final report for dissemination.

Supporting agency address information: AVCOM Eustis Directorate, Air Mobility R & D Lab., Ft. Eustis, Va. 23604.

SUPPORTED BY U.S. Dept. of Defense - Army

4.0013, COMMUNICATIONS - NUMERICAL SIMULATION OF PLASMAS AND HIGH-FREQUENCY COMMUNICATIONS
J. DENAVIT, Northwestern University, School of Technology, *Evanston, Illinois* 60201 (N00014-67-A-0356-0026)

The objective is to carry out research on the numerical simulation of plasmas and their interaction with electromagnetic fields. Such interactions are important in that, for example, the application of magnetic fields to moving plasmas provides a means of converting the thermal energy of combustion or fission directly to electrical power without the use of mechanical generators. Further, ionization effects in plasmas are important for radio frequency communications and telemetry from space and reentry vehicles. The work is thus of interest to the navy in communication systems via the ionosphere, power sources, in ballistic missile and atomic weapons effects, satellite surveillance, and in gaseous electronic devices.

Numerical methods for the simulation of collisionless plasmas will be developed based on periodic smoothing in phase space and time filtering of the fields. Smoothing in phase space will provide noiseless solutions over long times. Time filtering of the fields will allow for the use of time steps not limited by high-frequency electron oscillations.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0014, MANNED AIRCRAFT CONTROL - INVESTIGATION OF CONTROL AUGMENTATION & INTEGRATED AIRCRAFT INFORMATION DISPLAYS FOR IMPROVING MANUAL CONTROL
S.N. ROSCOE, Univ. of Illinois, Aviation Research Laboratory, *Savoy, Illinois* 61874 (N00014-67-A-0305-0025)

The objective of the research is to derive improved human engineering principles for the design of aircraft control and display systems through reallocation of the manual control tasks, improvement in the dynamic relationships between control inputs and resulting aircraft responses, and improved integrated control-display functional relationships.

The central task will involve systematic analysis and man-in-the- loop simulation to determine alternate methods for distributing control authority between the pilot and automated portions of the control system in order to minimize the difficulty of the pilot's task without depriving him of the minimum essential authority. In conventional control systems the pilot performs second and higher order integrating and coordinating functions. To the extent that the pilot can be unburdened of higher order functions and

inner loop control, his performance should be less variable and more precise. Exploration of reduced control order principles, improved perceptual-motor matching, and the selective application of computer aiding will underlie the research approach.

Supporting agency address information: Office of Naval Research 455, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0015, NAVY VEHICLE DESIGN AND CONSTRUCTION - DISPLAY/OPTICAL DATA INTEGRATION IN AIRCRAFT
R.L. JOHNSON, Univ. of Illinois, School of Engineering, *Urbana, Illinois* 61801 (N00014-67-A-0305-0021)

The presently existing problems in military avionics systems are potentially overcome by the use of optical avionics technology. The exploitation of this technology, along with the potential available in memory displays, predicts a revolutionary approach to military aircraft systems. Such systems propose solution to problems of grounding, electro-magnetic or radio-frequency interference, reliability, etc., thus enhancing the future potential of the 1980 time frame Navy and Marine Corps aircraft.

This task shall conduct research into interface between flat panel displays and computers. The effort will partition the functions of 'display processor'. The part of these functions assigned to the display system will be implemented on the display panel. The impact of this optimal partitioning on computer graphic systems will be evaluated.

Supporting agency address information: Office of Naval Research 411, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0016, NAVY VEHICLE DESIGN AND CONSTRUCTION - AEROELASTIC PHENOMENA IN THIN AIRFOIL CASCADES
S. FLEETER, General Motors Corporation, *Indianapolis, Indiana* 46206 (N00014-72-C-0351)

Obtain fundamental experimental data on aeroelastic phenomena in thin, airfoil cascades with the objective of developing improved analytical techniques, with increased range of validity, useful in the design and development of compact lightweight compressor components for advanced engine configurations. This research contributes to increased life and reliability of military aircraft engines with optimum performance by providing better design information for compressor components with minimum weight and volume.

The investigation is aimed at acquisition of experimental data and extension of aeroelastic testing of an isolated trunnoined or double- wedge airfoil in a cascade of cantilevered airfoils at supersonic speeds. Laser holography is used to determine vibrational characteristics at mach numbers for which there is no aeroelastic data available. The data closely approximates conditions occurring in turbofan engines and is useful in correlations with analytical predictions obtained from modeling techniques.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0017, COSMIC & SOLAR RADIATIONS IN NEAR SPACE, ITS INTERACTIONS WITH MAGNETOSPHERE & IONOSPHERE, & EFFECTS ON NAVAL OPERATIONS (ABBREV)
J.A. VANALLEN, Univ. of Iowa, School of Liberal Arts, *Iowa City, Iowa* 52240 (N00014-68-A-0196-0009)

The performance of naval communications, surveillance, detection and navigations is degraded or completely disrupted by ionospheric disturbances produced by the interaction of cosmic and solar radiation with the ionosphere. This work will provide quantitative information on the radiation environment of near space, on the interaction of solar particles and x-rays with the earth's ionosphere, and an increased understanding of the causes of magnetic storms, auroral and ionospheric disturbances, and communication blackouts.

Emphasis is on: corpuscular radiations trapped or transiently present in the earth's magnetic field, and solar, interplanetary and terrestrial phenomena associated with these radiations (e.g. Solar flares, aurorae, geomagnetic storms, heating of the atmosphere and ionospheric effects of particle precipitation); solar and galactic cosmic rays, energetic solar electrons; solar x-rays; very low frequency (vlf) radio phenomena in the magnetosphere; radio frequency emissions from the sun and flare activity; and interactions of the solar wind with the magnetosphere.

Supporting agency address information: Office of Naval Research 422, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0018, COMMUNICATIONS - IONIC CROSS-SECTIONS AND HIGH FREQUENCY COMMUNICATIONS
M.A. COPLAN, Univ. of Maryland, School of Engineering, *College Park, Maryland* 20740 (N00014-67-A-0239-0023)

The objective is to evaluate Navy high frequency communication systems in an atomic weapons' environment. Radio ionospheric communications systems used in operational circuits depend on electron and ion densities in the normal and disturbed ionosphere. The present work will determine atomic and molecular collision cross-sections needed to estimate these densities as related to communications effects. The work also has applications to the evaluation of ballistic missile signatures.

Work will consist of the measurements of cross-sections for such ion-molecule interactions as those between H ion, Li ion, Na ion, K ion and H2O and NH3. A cross-beam technique will be used. The results will be analyzed to give the attractive portion of the interaction potential between protons, alkali metal ions, and H2O and NH3. A time- of-flight and energy loss spectroscope will be used to investigate the dissociation of excited states of O2 and CO2 which yield metastable O.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0019, COMMUNICATIONS - WAVE AMPLIFICATION AND PARTICLE PRECIPITATION AT VLF
T.J. ROSENBERG, Univ. of Maryland, School of Engineering, *College Park, Maryland* 20740 (N00014-67-A-0239-0033)

The objective is to evaluate the effect of the ionosphere on radio communications systems used in Navy operations and to help in the design and operation of such systems. The propagation and attenuation of very low frequency radio signals by the ionosphere, from both ground-based and satellite transmitters are governed by the electron and ion densities in the ionosphere. The present work will examine magentospheric ionospheric coupling and resulting radio emissions and particle-precipitation through wave particle interaction mechanisms.

The work will consist of a study of the production of vlf radio signals following the natural injection of plasma into the magnetosphere causing electron precipitation through wave particle interaction. Balloon-borne measurements will be made of the x-ray bremsstrahlung for precipitated electrons. Interactions will be investigated that are stimulated by both lightning-generated whistles and by land-based radio- transmitter vlf radio sources. Conjugate point observations will also be made.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0020, COMMUNICATIONS - OPTICAL ABSORPTION AND LIGHT SCATTERING IN MAGNETIC SEMICONDUCTORS
C.H. PERRY, Northeastern University, School of Arts, *Boston, Massachusetts* 02115 (N00014-68-A-0207-0004)

This work on optical absorption and scattering in magnetic semiconductors and disordered systems is applicable to the development and improvement of optical switching devices, display systems and magnetic instrumentation used by the Navy in its communications and surveillance operations.

It is proposed to measure optical absorption in disordered alloys as a means of studying their electronic structures. A spectroscopic investigation of the insulator to semiconductor transition

in magnetite (Fe3O4) will be carried out and the theory for this transition will be developed. The same will be done for a series of transition metal disulfides (i.e. FeS2, CoS2, NiS2, CuS2, ZnS2) which also have interesting metal to insulator transitions.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0021, MULTIPURPOSE DISPLAY REDESIGN AND INTEGRATION (BIACC)

UNKNOWN, Pacer Systems Incorporated, *Burlington, Massachusetts* 01803 (N62269-74-C-0371)

Preparation of display system, keyset and control functions suitable for the BIACC (basic integrated aircraft command and control) laboratory application.

Incorporate design, modification and refurbishment of mod iv display, mod v keysets and control tray functions (typewriter keysets, trackball and trackball control functions). Provide 1/0 interface compatibility for these equipments with a AN/UYK-20 GFE computer which shall be utilized for BIACC laboratory applications.

Supporting agency address information: Naval Air Development Center, Aero-Electron Tech. Dept. 20-7, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0022, COMMUNICATIONS - SOLID STATE ELECTRONIC COMPONENTS AND CONTROL-JSEP

N. BLOEMBERGEN, Harvard University, School of Engineering, *Cambridge, Massachusetts* 02138 (N00014-67-A-0298-0006)

To provide the Navy the technological basis for improved solid state and electromagnetic components and devices for communications, surveillance, navigation and information handling by taking advantage of vast expertise available at institutions of recognized standing such as this one under the Joint Services Electronics Program. The study of fundamental physical and electronic processes and properties leads to advancement in the technology of lasers and optical components, heat- sensitive detectors, accurate navigation schemes, missile and aircraft guidance and control, high-performance microelectronic circuitry having small size and weight and methods for handling efficiently large amounts of data.

The subject emphasis at Harvard is in nonlinear optics, frequency conversion, laser damage, short optical pulses and optical phenomena in liquid crystals; the structure and properties of amorphous materials such as Ge and Ge-Sn; fabrication of fine, grained (50-300A) optically transparent ceramics (BaTiO3, KDP, NaNO3) by the freeze-dry technique; control and modeling of large systems and networks, decision-making and tradeoffs.

Supporting agency address information: Office of Naval Research 427, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0023, COMMUNICATIONS - THEORY OF ANTENNAS AND ELECTROMAGNETIC WAVES-JSEP

T.T. WU, Harvard University, School of Engineering, *Cambridge, Massachusetts* 02138 (N00014-67-A-0298-0005)

To provide the Navy the theoretical and experimental basis for improved antennas. The study of radiation, scattering and diffraction of electromagnetic waves and the propagation of electromagnetic waves in various media leads to the advancement of specialized antennas for use on communication and navigation satellites, direction finders, submarines and aircraft.

Work is carried out on odd-shaped antennas such as wire antennas projecting from satellites (modified dipole). Corrections for monopoles driven over a ground plane; small high-gain ferrite antennas for rocket guidance; slot antennas for use on aircraft and missiles; long antennas over salt water (dissipative medium); high-gain log periodic antennas; directional antenna arrays; subsurface communication antennas; and antennas for use in plasmas (in space or in a radiation environment).

Supporting agency address information: Office of Naval Research 427, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0024, NAVIGATION - MATHEMATICAL METHODS IN ORBITAL MECHANICS AND SATELLITE GEODESY

G.E. GIACAGLIA, Smithsonian Institution, *Cambridge, Massachusetts* 02138 (N00014-71-A-0110-0004)

Representation of high-frequency variations in gravity and deflection of the vertical have an important influence on Navy problems in inertial navigation and missile platform alignment at sea. It is highly desirable that such determinations be made on a world-wide basis (probably most accurately by satellite altimetry). The representation and analysis of the data present a formidably difficult problem, for which alternative mathematical and computational solutions should be developed and evaluated.

This research concerns mathematical analysis of problems encountered when very short-wave length features must be included in a representation of the gravity field of the earth, e.g., in satellite altimetry measurements. The mathematical formalism suggested is applicable to a wide variety of situations in which functions are represented on a sphere. Related problems in orbital mechanics will be included in the research effort.

Supporting agency address information: Office of Naval Research 432, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0025, COMMUNICATIONS - TACTUAL VIBRATORY DISPLAYS FOR VEHICLE CONTROL

D.H. ROSS, Sanders Associates Inc., *Nashua, New Hampshire* 03060 (N00014-73-C-0031)

In many naval operational missions, the task or environmental demands placed on human operators overload man's visual and auditory senses. Aircraft flight control and activities in dark or noisy environments represent naval operating conditions where another medium of communication would be a significant improvement. Tactual displays hold out the promise of reducing operator dependence on visual and auditory displays.

Modifications of electro and bimorph vibrotactor configurations and coding are assessed in a laboratory setting to optimize format parameters by the increase of data rate. Performance on these tactual displays is compared to performance achieved with the standard visual flight display on one and two-axis tracking tasks; in addition, analytic predictions of pilot-vehicle performance in control tasks beyond those studied in the laboratory are developed. In an F-4 aircraft simulator, pilot performance with tactual display of angle-of-attack (single axis) and pitch-and-bank control (two axes) is assessed and compared to standard flight displays.

Supporting agency address information: Office of Naval Research 455, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0026, PHASE VOLUME STORAGE OF NAVAL AIRCRAFT NAVIGATIONAL INFORMATION

D. STAEBLER, David Sarnoff Research Center, *Princeton, New Jersey* 08540 (N00019-74-C-0312)

Study and optimize the performance of electro-optic crystals for storage of holographic information. This research will be directed toward applications involving the storage of information for navigational type use by Navy pilots during flight.

The use of crystals of LiNbO3 for phase holographic storage will be investigated. The program will consist of a materials investigation directed toward achieving a detailed understanding of the roles of impurities and defects and the optimization of growth and crystal chemistry parameters. The program will include optical and transport studies of LiNbO3 as well as electron paramagnetic resonance probing in microscopic detail of its impurities and defects.

Supporting agency address information: Naval Air Systems Command 310B, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0027, DEVELOPMENT OF DC LOAD CONTROLLER WITH BIT

R. ISHAM, Radio Corporation of America, *Somerville, New Jersey* 08876 (N62269-72-C-0642)

To develop, fabricate and test hybrid solid state dc power controllers for use in the power distribution system of the aaes (advanced aircraft electric system) controllers to perform in accordance with NAVAIRDEVCEN Specification No. AEE-10.

Select high power transistors, design control circuits, perform thermal analysis, fabricate breadboard and test. Package successful design using hybrid solid state techniques. Perform verification tests in accordance with NAVAIRDEVCEN Specification No. AEE-10.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 3043, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0028, NAVY VEHICLE DESIGN AND CONSTRUCTION - COLOR RESEARCH FOR AIRCRAFT DISPLAYS

W.H. TEICHNER, New Mexico State University, School of Arts, *Las Cruces, New Mexico* 88001 (N00014-70-A-0147-0003)

This will attempt to determine which classes of displays would enjoy significant performance advantages through the use of color. The initial efforts will concern symbolic and pictorial displays where color is used as a critical coding dimension. Alternatively the interference effects of irrelevant color will also be studied.

The first step will be to determine the interaction among variables such as type coding, redundancy, density, task difficulty, amount of practice, etc. After the significant interactions have been found, a suitable factorial experiment will be designed. Concurrently an integrating theoretical framework will be postulated. The results of the experimental work will be incorporated into the framework. The ultimate result should allow a derivation of the conditions under which color would be useful in a display application.

Supporting agency address information: Office of Naval Research 461, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0029, ADVANCED ELECTRONIC FLIGHT CONTROL SYSTEM DEVELOPMENT

D. GERTZ, Grumman Corporation, *Bethpage, New York* 11714 (N62269-74-C-0205)

To initiate, evaluate and assist in the development of advanced AFCS (automatic flight control systems) for new Navy aircraft. The procedure is to utilize improved technologies in airborne digital computers, FBW (fly-by-wire) control systems, solid state sensors, data management systems and inflight identification techniques to produce a combat-survivable, fail-operational, failure-detectable and easily maintainable flight control system. Since new aircraft will require full-time stability augmentation, secondary objectives are improved redundancy and monitoring techniques to provide ultra-reliability.

Investigations will be made to determine the feasibility of digital flight control computers, solid state sensors, FBW interfaces, actuator interfaces, integrated control systems and reliability techniques. consequence of these investigations will be the formulation of new specifications to update Specification MIL-C-18244A to reflect the requirements of highly augmented aircraft and provide adequate guidelines for future AFCS development.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 3015-2, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0030, COMMAND AND CONTROL - ALTITUDE REPORTING

R. BOVA, Beukers Laboratories Inc., *Bohemia, New York* 11716 (N00014-73-C-0292)

The feasibility of a low cost altitude encoder will be determined. The encoder should meet the requirements set forth in the National Standard for the IFF Mark X (SIF) Air Traffic Control Radar Beacon Characteristics (ATCRBS).

The aneroid capsules used as altitude sensors in radio-sondes are produced at very high volume for low cost. These capsules will be modified to include a variable capacitor within the capsule. Electronic circuitry will convert the variability of the capacitor into the appropriate altitude code. The devices will be tested for uniformity, repeatability, and linearity. Insensitivity to temperature and vibration will also be tested.

Supporting agency address information: Office of Naval Research 411, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0031, TACTICAL LANDING SYSTEM GUIDANCE TECHNIQUES

J. HALLACY, Cutler Hammer Incorporated, *Farmingdale, New York* 11735 (DAAB07-68-C-0673)

To develop a landing system technique that has (a) high potential for providing satisfactory performance in the Army's severe tactical environment, and (b) sufficient versatility to permit determination of guidance system parameters necessary for safe helicopter instrument approaches under tactical operational conditions.

Develop a flexible scanning beam landing system (A-SCAN) under contract with Airborne Instruments Laboratory to provide selectable glide slope angles, multiple localizers, variable horizontal and vertical course widths, optional DME, course softening, split or colocated siting, and altitude above touchdown. An in-house Flight Research Program (Landing Flight Research Facility) is being conducted to evaluate scanning beam guidance techniques and to determine necessary features of follow-on fieldable equipment.

Supporting agency address information: ECOM Avionics Lab AMSEL-VL- D, Ft. Monmouth, N.J. 07703.

SUPPORTED BY U.S. Dept. of Defense - Army

4.0032, LASER GYRO INERTIAL NAVIGATOR

P. SISSKIND, Sperry Rand Corporation, *Great Neck, New York* 11020 (N00019-74-C-0150)

This contract is for a flight demonstration model inertial measurement unit (IMU) leading to development of a low cost high- accuracy laser gyro inertial guidance system.

The proposed system employs a double rotation technique to effectively nullify the inherent gyro drift rates.

Supporting agency address information: Naval Air Systems Command 533312A, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0033, COMMUNICATIONS - PHOTOELECTRON PROCESSES FOR IONOSPHERIC MODELING TO EVALUATE RADIO COMMUNICATIONS EFFECTS

D.T. FARLEY, Cornell University, School of Electrical Engin., *Ithaca, New York* 14850 (N00014-67-A-0077-0029)

The objective is to evaluate the effect of the ionosphere on radio- communication systems used in Navy operations and to help in the design and operation of such systems. The propagation and attenuation of high- frequency, very low frequency and very high frequency radio signals by the ionosphere, by both ground-base and satellite transmitters, are governed by the electron and ion densities in the ionosphere. The present work develops a model to estimate these electron and ion densities as a function of latitude, longitude, altitude, season, time and solar activity. The work also has applications to the estimation of the effects on ionospheric communications due to high altitude nuclear explosions used, for example, in ballistic missile defense.

A model will be developed of the energy distribution of photoelectron escape fluxes in the ionosphere. The effects of photoelectron fluxes will be examined in terms of heating and excitation processes. In particular, the following will be considered: electron and ion temperatures, observable airglow, plasma line enhancement of incoherent scatter signals, and reaction rates altered by excited ions and neutral species.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0034, NAVY VEHICLE DESIGN AND CONSTRUCTION . VOLUMETRIC DISPLAYS FOR AIRCRAFT
R. BARNES, Battelle Memorial Institute, *Columbus, Ohio* 43201 (N00014-73-C-0254)

This aircraft instrumentation research program defines new approaches and concept to overcome problems encountered in all weather flight of military aircraft. The task will seek to exploit recent developments in technology and prove the feasibility of a volumetric display. This display will generate a real luminescent image of three dimensional images and symbology. The problems of representing a three dimensional situation on a two dimensional display can be evaluated and overcome by this new concept. The potential for overcoming many of the present day aircraft instrumentation problems is present in this concept.

The contractor will conduct research on the sequential excitation fluorescence (SEF) of diatomic halogens. SEF has been demonstrated as a feasible means of generating a true volumetric display, however, the materials used in the demonstration are known to be highly inefficient. A preliminary search for a more efficient material has suggested the diatomic halogens. Very little is know about the spectroscopy of these gases in the excited state. This effort will measure life times and effective cross-sections of potentially useful excited states.

Supporting agency address information: Office of Naval Research 411, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0035, PROCUREMENT OF AC AND DC POWER CONTROLLERS
R. SKAMFER, Westinghouse Electric Corp., *Lima, Ohio* 45802 (N62269-74-C-0223)

To procure samples of ac and dc power controllers which have been developed by Westinghouse Electric Corporation.

The power controller will be evaluated.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 3043, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0036. FLUIDIC ROLL RATE DAMPING SYSTEM-IMPROVED UNIT
S. ONUFREICZUK, General Electric Company, *Philadelphia, Pennsylvania* 19123 (N00019-73-C-0370)

To develop, design, fabricate and evaluate a ram-air fluidic roll rate damping system with one moving part.

Utilizing development efforts for a flueric roll rate damping system produced under Naval Weapons Center Contract N00123-72-C-1968, the contractor will design and fabricate a roll rate damping system with one moving part. This prototype will be subjected to extensive test and evaluation.

Supporting agency address information: Naval Air Systems Command 52022A, Washington, D.C. 20361. W

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0037, DESIGN, DEVELOP, FABRICATE, FURNISH MONOCULAR TELESCOPE (STABILIZED)
D. FRASER, Fraser Volpe Corporation, *Warrington, Pennsylvania* 18976 (N62269-73-C-0802)

This contract follows a study effort which recommended certain configurations for airborne Marine Corps applications. It will provide models of this hardware for test and evaluation.

Two models are to be provided. Both employ the same optical elements and image stabilization. They differ in the inertial elements, one will be a non-powered 'passive' type, the other will be a battery- powered 'active' type which includes an electronic servo control system.

Supporting agency address information: Naval Air Development Center, Aero-Electron Tech. Dept. 202139, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0038, COMMUNICATIONS - ATOM-ATOM SCATTERING CROSS-SECTIONS FOR EVALUATING RADIO-COMMUNICATIONS EFFECTS
J.C. BROWNE, Univ. of Texas, Computation Center, *Austin, Texas* 78712 (N00014-67-A-0126-0017)

The objective is to evaluate radio-communications via the ionosphere used in Navy operational circuits. The ionization of atoms by atom impact and the scattering of electrons, ions and photons by atoms and molecules are processes governing radio transmission, including black-out effects. The present work develops calculational techniques to estimate such ionization and scattering interactions for both the normal and disturbed atmosphere. The work also has applications to the estimation of ballistic missile signatures in atomic weapons' environment.

Calculations will be made of scattering cross-sections and rate coefficients for such processes as He ion and He going to He ion and He excited, Li ion and He going to Li ion and He excited, e and N2 going to e and N2 excited. The calculation will involve evaluation of appropriate wave functions, potential curves, and coupling matrix elements. Quantum formulations will be compared with classical trajectory computations and comparison with experimental work carried out.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0039, EVALUATION OF NEW POWER CONTROLLER CONCEPTS
A.J. MAREK, Vought Aeronautics Company, *Dallas, Texas* 75222 (N62269-74-C-0151)

To design, breadboard and evaluate various power controller concepts which will demonstrate the feasibility of producing low cost power controllers, ac controllers with current limiting, and universal (ac, dc) controllers and to establish built-in-test requirements for power controllers.

Following a survey of available high power current carrying devices, several circuits encompassing the characteristics sought will be breadboarded and evaluated. Circuit changes will be made as required to prove the feasibility of developing the items denoted in 23 above.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technol. Dept. 3043, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0040, SOSTEL/AIMIS INTERFACE STUDY
J.R. PERKINS, Vought Aeronautics Company, *Dallas, Texas* 75222 (N62269-74-C-0265)

To determine SOSTEL (solid state electric logic) fault modes and determine in what format this fault information must be presented so as to be available to the crew display station AIMIS (advanced integrated modular instrumentation system).

An assessment of possible SOSTEL failure modes will be evaluated to determine type and source of such failures. A matrix will be prepared to determine criticality of such failures. Operation of the AIMIS integrated display system will be studied to determine the best method of presenting the SOSTEL failure data to the display system.

Supporting agency address information:.Naval Air Development Center, Air Vehicle Technol. Dept. 3043, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0041, NAVY VEHICLE DESIGN AND CONSTRUCTION - AIRCRAFT COCKPIT SWITCH FUNCTIONS
D.K. GRAHAM, Boeing Company, *Seattle, Washington* 98108 (N00014-72-C-0191)

In the 1980 to 1990 time frame, the computer will assume an expanded role in aircraft subsystem control and display management. With this higher level of integration, new switching and control techniques will be required. The feasibility of simplifying operators tasks in selecting, switching and managing multifunction displays in airborne weapons systems will be demonstrated.

This research will investigate switching concepts as a part of a high integrated aircraft, assuming implementation of the Navy's all applications digital computer (AADC) and advanced integrated modular instrumentation system (AIMIS). Research will include: (1) establishing technology requirements for switching and legend hardware; (2) developing principles and requirements for computer control of a multiplexed multifunction switching/display system; (3) evaluation of various input-output schemes with respect to software and control logic concepts; (4) determining multifunction switching/display configurations and formatting requirements for optimum operator/system interface.

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0042, THE STUDY OF OPERATIONAL PROBLEMS AND TECHNIQUES IN WIND TUNNEL TESTING OF VTOL AND STOL VEHICLES 10655-E
W.H. RAE, Univ. of Washington, School of Engineering, *Seattle, Washington* 98105 (DA-ARO(D)-31-124-72-G190)

To evaluate existing theories for correcting V/STOL wind tunnel data for wall effects. This research will contribute to the improved testing of V/STOL aircraft in wind tunnels. Wall correction theories will be validated and will contribute to better factual understanding of wind tunnel data.

The wall correction theories of Glauret, Heyson and Joppa will be compared with special attention being given to tail corrections which are critical in determining the proper vehicle pitching moments from wind tunnel tests. Additional data will be obtained on different V/STOL aircraft configurations for flow breakdown and the resulting wind tunnel test limits.

Supporting agency address information: OCRD Research Office, Durham, N.C. 27706.

SUPPORTED BY U.S. Dept. of Defense - Army

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production And Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, A STUDY OF MAGNETOSPHERIC SUBSTORMS IN CONJUNCTION WITH THE VELA SATELLITE DATA
S. AKASOFU, Univ. of Alaska, Geophysical Institute, *College, Alaska* 99735 (AT(45-1)-2229 05)

A study of multi-satellite and ground data (VELA satellites, IMP-H and -I satellites, DMSP satellites, Alaska meridian all-sky photographs).

Modeling of the magnetosphere by using a diffuse image dipole.

SUPPORTED BY U.S. Atomic Energy Commission

5.0002, APPLICATIONS OF SATELLITE DATA TO PROBLEMS IN FISHERIES OCEANOGRAPHY
M. STEVENSON, Inter Amer. Trop. Tuna Comm., *La Jolla, California* 92037 (04-4-158-28)

Objective: To evaluate the usefulness of VHRR data for its applicability to problems in fishery oceanography and to study the feasibility of a multi-stage environmental data system.

Approach: The investigator is participating in cooperative surface data collection projects in the oceanic areas off the northwest coast of Africa and Baja, California. Using surface truth data from these locations, VHRR data will be evaluated for delineating thermal gradients and fronts at various locations. Cloud and meteorological relationships to sea surface thermal structure as well as the effects of the atmosphere on radiation attenuation are being studied using VIS and IR data from NIMBUS, NOAA, SKYLAB, ERTS and ATS (GOES) satellites. Fish catch statistics are used whenever available to confirm existing and to develop new relationships between the environment and tuna populations. Monitoring of thermal phenomena, sea surface temperature mapping, and testing of hypotheses about the thermal features and tuna habitats will be continued.

The use of low resolution data will be used to find clear areas for which higher resolution thermal (VHRR) and color (ERTS, SKYLAB) data for correlation of thermal and color gradients can be studied. The 1-2 km resolution on NOAA-2 and GOES satellites and 100 m resolution on ERTS are providing impetus to consider a multi-state sampling scheme using several sources of satellite data for a prototype system to provide environmental information to fisheries oceanographers.

Progress: The application of satellite data to fisheries oceanography has been studied by the grantee (Inter-American Tropical Tuna Comission-IATTC) for the past five years. IATTC participated in the Little Window I and II experiments of 1969-1970 with NOAA and the Naval Oceanographic Office. The relationship between tuna catch data and the oceanic environment, the effects of the atmosphere on the satellite infrared data, the relationships of clouds to sea surface thermal data, data handling techniques, sea surface temperature charting techniques, and the distribution of biota in various ocean thermal patterns are described in IATTC publications dated April 1972 and June 1973.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0003, NAVY ENVIRONMENT - AIR-SEA INTERACTION AND CONVECTION STUDIES
T.D. FOSTER, Univ. of California, Graduate School, *San Diego, California* 92038 (N00014-69-A-0200-6009)

Radiative flux and thermohaline convection at and near the sea surface affects the electromagnetic and acoustic properties of the water which are of concern to nonacoustic and acoustic ASW systems. The object of this research is to investigate these phenomena in order to determine their effects on water temperature structure in the uppermost layers.

Theoretical, laboratory, and field studies will be made of radiation flux, and convective processes using infrared and Schlieren techniques. These investigations will involve the use of surface platforms and an oceanographic aircraft equipped with an infrared scanner and dual-wavelength radiometer.

Supporting agency address information: Office of Naval Research 481, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0004, NOISE IN AND AROUND BUILDINGS (CBT)
A.I. RUBIN, U.S. Dept. of Commerce, Natl. Bureau of Standards, *Washington, District of Columbia* 20234

Although NBS has a major research program dealing with noise, there is no ongoing program associated with the responses of people to noise in buildings. The Sensory Environment Section (CBT) in conjunction with the Applied Acoustics Section (IBS) is initiating such a program. The research is directed toward a better understanding of the factors causing disturbances due to noise. The approach will be to obtain both physical and human response 'measurements' of sounds and correlate these findings. One of the major purposes of the project is to evaluate the current methods of rating materials and spaces with respect to acoustical properties, and if desirable, develop new techniques which can be better related to human responses. The initial research activity is to identify and measure the basic parameters associated with impact sounds -- physical and human response.

Objectives: A. To develop an improved procedure, employing physical and human response data, to evaluate impact sounds; B. To conduct impact sound studies using a model chamber and validate findings against full-scale tests.

Motivation: Government agencies such as EPA, HUD and DOT have indicated that noises experienced by building occupants is the most widespread problem faced by noise researchers. Attitude surveys have indicated that impact noises particularly are a major source of complaint in residences. At present, there is considerable controversy concerning the appropriateness of the most widely used test method employed to measure impact sound. Many researchers and designers want another procedure to be developed -- one which can readily be associated with normal use conditions and is substantiated by human response data. The current method is judged to be weak in both of these respects.

The human response data base is not only questionable in the area of impact sounds. Very few studies have been performed to test the adequacy of the widely used methods of rating materials

(sound transmission classes - STC) or spaces (noise classifications - NC curves). As a result, rating schemes are in widespread use, which are subject to criticism from the standpoint of performing the function that they were designed for.

Approach: Impact measurements will be made in the chamber and the results compared with typical full scale tests. (Text Abridged)

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

5.0005, POWER - HYDROGEN GENERATION FROM SEAWATER

M. VITOUSEK, Univ. of Hawaii, Hawaii Inst. of Geophysics, *Honolulu, Hawaii* 96822 (N00014-67-A-0387-0019)

The objective of this program is to generate hydrogen from seawater using tidal currents in order to provide fuel for remote installations.

A Navy tugboat will be modified so that its main propulsion motor is usable as a motor or generator. The boat will be then taken to Fanning Island and anchored between two atolls. The tidal currents will be used to drive the boat's propeller to generate electrical power using the main propulsion motor/generator. The power will be used to generate hydrogen from seawater as the fuel for Fanning Island.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0006, NAVY ENVIRONMENT - THE MARINE WEATHER ASPECTS OF THE TRADE WIND CUMULUS CLOUD

A.H. WOODCOCK, Univ. of Hawaii, Hawaii Inst. of Geophysics, *Honolulu, Hawaii* 96822 (N00014-67-A-0387-0009)

For the purpose of improving the naval meterological forecast at sea, this research is conducted to determine the mechanism, the source and size range of the nuclei involved in the warm rain process of the trade wind cumulus cloud.

This research is conducted by means of light aircraft for sampling of the aerosol over the sea surface and also at the mountain observatory in Hilo, Hawaii. The observatory is frequently in cloud and facilitates the cloud sampling.

Supporting agency address information: Office of Naval Research 465, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0007, SURVEILLANCE - ABSORPTION AND REFLECTION OF INFRARED RADIATION BY WATER AND HYDRATED MATERIALS

D. WILLIAMS, Kansas State University, School of Arts, *Manhattan, Kansas* 66502 (N00014-67-A-0403-0001)

To measure the reflection and absorption of infrared radiation by water. These properties govern infrared detection of hot objects on the surface of the sea against a water background and visibility through haze, clouds, and fog typical of the naval environment. Thus the work directly supports Naval programs in surveillance, detection, and communications.

The fractions of incident infrared radiation reflected and absorbed by water and hydrated materials are determined for wavelengths 2-133 micrometers. The angle of incidence is varied, and light polarized paralled or perpendicular to the plane of incidence is measured separately. A solution of the Fresnel equations or the Kramers-Kronig relations allows calculation of the refractive index and the absorption coefficient (optical constants) of the materials as a function of wavelength.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0008, ATMOSPHERIC INFLUENCES ON ECOSYSTEMS AND SATELLITE SENSING

G.R. COOPER, Univ. of Maine, Agricultural Experiment Sta., *Orono, Maine* 04473 (ME00265)

Objective: Develop methods for evaluation and utilization of remotely sensed data pertaining to agricultural ecosystems from ERTS and aircraft. Evaluate environmental effects by use of a chemical reaction temperature integrator and an inter-regional phenological network.

Approach: A photographic analysis of ground cover utilizing ground truth stations for verification of the data. Both aircraft and satellite photographs will be used. Chemical reaction integrators plus living plants as phenological tools will be used to follow the course of annual and long-term climatological effects on plant growth.

Progress: Essentially the problems of processing Ektachrome Infrared film have been resolved to the satisfaction of the users, in the Dept. of Botany and Plant Pathology. The processing of 70 mm Aerochrome, type 2443 still has some way to go but looks more encouraging than last year when processed to a positive transparency. Negative processing still seems the best approach on type 2443. Work has been initiated using G.A.F. 1,000 film for studies of estuaries in Maine. The Maine network of Persian Lilac sites was refurbished and expanded during 1973. All old sites with one exception were replanted and revitalized and two new sites were established thus affording reasonably good coverage for the state. In 1974 the network will be expanded again in an attempt to fill in some gaps and strengthen the reporting. Working continuing on phenology experiment. Methods for correlating ground and satellite imagery have been developed. Film density relations using the 05 and 07 bands are being used to quantify phenological change with imagery.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

5.0009, OPTIMIZING RESOURCE USE IN C & O CANAL REGION AND EFFECT IN ADJACENT RURAL AREAS

D.F. TUTHILL, Univ. of Maryland, Agricultural Experiment Sta., *College Park, Maryland* 20740 (MD-A-019-AF)

Objective: Study the present land ownership and use in the C & O Canal Region; support potential ownership and use to accomplish goals of public access and enjoyment; assess the present and potential recreational and other resources and their uses; develop cost-benefit analysis.

Approach: Present land ownership and use patterns will be obtained from existing data and field observations. Potential uses will require innovative ideas to retain agricultural use and rural flavor and yet allow public access within the department of the Potomac River Basin Compact and the Chesapeake and Ohio National Historic Park, and also provide tax and income returns to the surrounding area. The present recreational uses will be established, and potential and innovative uses will be considered. Costs and benefits to the public sector will be estimated.

Progress: The analysis of the data collected during the summer of 1972 was completed and written up by Lee A. Twentyman in a Master's paper. (See below; Mr. Twentyman received his M.S. degree under the non-thesis option). A comprehensive survey of present land use patterns is being conducted. Working from aerial photographs, a graduate student has been classifying all land within one-half mile of the C & O Canal National Park by its present use. The job of classification is nearly complete and will be followed immediately by tabulation so that the location and acreage of the various land uses will be known. Efforts are being made to learn of the development plans of the National Park Service so that the areas for more intensive development can be identified and the effectiveness of present zoning regulations can be evaluated.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

5.0010, RESEARCH ON COST-EFFECTIVE AND DURABLE COMPOSITE COLLECTOR PLATES FOR SOLAR ENERGY COLLECTORS FOR THE HEATING AND COOLING OF BUILDINGS

T. SANTALA, Texas Instruments Incorporated, *Attleboro, Massachusetts* 02703

This study will select intermetallic compounds to optimize durability and solar absorptivity for tube-in-sheet collector plates.

A series of intermetallic compound surfaces will be manufactured using composite metal technology and the absorptivity will be measured in a solar simulator by means of a calorimetric

technique. Simultaneously, a parametric study will be conducted to establish the rationale for the selectivity obtained by the impregnation of the porous metallic surfaces with transparent media. These results will be used to develop an impregnation technique using glass or enamels to assure low emissivity. The impregnated samples and unimpregnated control samples will be subjected to cyclic humidity-temperature and atmospheric corrosion testing to establish the criteria for durability. The most cost-effective and durable collector plate material system will be selected and an optimum heat transfer channel geometry will be designed. Several collector plates will be manufactured using the optimum design, and their performance will be evaluated.

SUPPORTED BY U.S. Natl. Science Foundation

5.0011, NAVY ENVIRONMENT - STRATOSPHERIC OZONE AND CHEMICAL BALANCE OF THE UPPER ATMOSPHERE

J.L. KROENING, Univ. of Minnesota, School of Liberal Arts, *Duluth, Minnesota* 55812 (N00014-67-A-0113-0028)

The objective of this work is to furnish to the University of Wyoming calibrated balloon ozone units, along with testing service, and post flight analysis of the ozone observations. At the University of Wyoming the ozone units are incorporated in a combined sonde that includes water vapor and dust sensors. The combined unit is used by University of Wyoming to obtain stratospheric observations by which the effect of aircraft engine emission on the stratosphere might be determined.

Commercial sensors are calibrated and modified for interfacing with University of Wyoming equipment. The ozone observations which are obtained from a widely spread latitudinal network in both north and south hemispheres are analyzed and examined in conjunction with dust, and water vapor data.

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0012, NAVY ENVIRONMENT - FOG MODIFICATION POSSIBILITIES BY MEANS OF ELECTRICALLY CHARGED AEROSOLS

P.B. WAGNER, Univ. of Nevada, Desert Research Institute, *Reno, Nevada* 89507 (N00014-71-A-0135-0003)

For the purpose of aiding certain naval operations through fog clearing techniques, the aim of this research is to measure in real time the electric field and charge distribution in and above marine fog and additionally to infer charge transport mechanisms in fog.

The electric field distribution in and above marine fog will be measured by means of instrumentation on the end of a fifteen foot probe that projects from the nose of the NCAR de Haviland Buffalo aircraft. Collateral measurements from the aircraft will include temperature, pressure, and fog drop size.

Supporting agency address information: Office of Naval Research 412, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0013, NAVY ENVIRONMENT - FAST SCAN WEATHER RADAR

M. BROOK, New Mexico Inst. Min. & Tech., Graduate School, *Socorro, New Mexico* 87801 (N00014-67-A-0267-0004)

The objective of this research is to time resolve, to less than a minute, whole sky cloud and thunderstorm developments by means of an extremely fast scanning radar. The naval relevance of the research would be to tactical operations where it would be possible to rapidly observe, detect and exploit changes in a developing weather situation.

In this research, cloud and thunderstorm developments are observed from the Langmuir Observatory from atop Mt. Baldy in New Mexico. An extensive complex of observing equipment is used, but the principal and newest addition to the complex, is a fast scanning radar that turns four times/sec on a horizontal axis and makes a complete revolution around a vertical axis every 15 seconds.

Supporting agency address information: Office of Naval Research 412, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0014, NAVY ENVIRONMENT - COMBINED METEOROLOGICAL, ACOUSTIC AND RADAR OBSERVATIONS ON SPECIFIC STAGES OF DEVELOPMENT OF CUMULUS CLOUD

C. HOLMES, New Mexico Inst. Min. & Tech., Graduate School, *Socorro, New Mexico* 87801 (N00014-67-A-0267-0006)

The objective of this research is to determine the mechanism by which precipitation from a cloud is enhanced by a lightning stroke. Understanding of the mechanism could furnish the Navy important clues as to how the cloud's precipitation processes may be modified.

In the conduct of this research, the radar precipitation echo of the cloud is carefully positioned by means of a fast scanning radar that goes through 30 range gates for each fix of the azimuth scan. In addition there is a dense array of rain gauges below the cloud and also a sufficiently dense array of microphones for acoustic reconstruction of the channel.

Supporting agency address information: Office of Naval Research 412, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0015, NAVY ENVIRONMENT - INTERNAL WAVES INITIATED BY TEMPERATURE INVERSIONS

J.H. CLARKE, Brown University, Graduate School, *Providence, Rhode Island* 02912 (N00014-67-A-0191-0021)

Clear air turbulence in the atmosphere and similar turbulence in the ocean interior, despite their importance for naval missions, have thus far defied understanding of their initiation, development and decay. When fluids possess density stratification and velocity shear, there exist conditions under which internal waves form unstably, break and create turbulent regions which are not homogeneous with the ambient environment. Since initiation of such waves is not understood, intensive analysis is necessary to discover mechanisms which account for their presence.

Clear air turbulence has been observed to occur often in the presence of a temperature inversion at the top of which a shear layer exists. In this investigation such a layer is treated as a heat engine and will be analyzed to discover the condition under which clear air turbulence will develop. The results will be integrated with an experimental simulation of clear air turbulence in the Brown University low speed tunnel and should lead to an explanation of the formulation of this type of clear air turbulence.

Supporting agency address information: Office of Naval Research 438, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0016, COMMUNICATIONS - POLAR IONOSPHERIC MODELING FOR EVALUATION OF RADIO COMMUNICATIONS

L.R. MEGILL, Utah State University, School of Engineering, *Logan, Utah* 84321 (N00014-67-A-0220-0004)

The objective is to evaluate the effect of the ionosphere on radio- communication systems used in Navy operations and to help in the design and operation of such systems. The propagation and attenuation of high- frequency, very-low frequency, and very-high frequency radio signals by the ionosphere, by both ground-based and satellite transmitters, are governed by the electron and ion densities in the ionosphere. The present work develops a model to estimate these electron and ion densities as a function of latitude, longitude, altitude, season, time and solar activity. The work also has applications to the estimation of the effects on ionospheric communications due to high altitude nuclear explosions used, for example, in ballistic missile defense.

A lumped parameter method will be used to obtain ionization profiles in the D-region as a function of particle input. E-region ion chemistry will be evaluated from direct calculation of the processes involved, including sporadic-e effects and wind fields. The known ion- chemistry of the F-region will be used to include particle ionization effects and generate auroral phenomena numbers. The effect of auroral energy inputs, such as particles and fields, in setting up wind velocities will be estimated.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, MILITARY PERFORMANCE AND STRESS- FACTORS LEADING TO DECREMENTS OF PERFORMANCE AND DISEASE

F.W. HEGGE, U.S. Army, Neuropsychiatry Division, *Washington, District of Columbia* 20012

Stressful environments, physiological conditions and performance demands likely to produce significant deterioration in the accomplishment of a soldier's mission are studied. The behavioral and physiological functions that contribute to deteriorated performance are identified, and therapeutic and prophylactic stragies are developed.

Using psychophysiological and operant methodology, time series analysis, and computer-based control and analysis techniques, behavioral and physiological events are isolated, analyzed, and controlled. Endogenous and exogenous factors contributing to behavioral and physiological rhythmicity and performance levels are studied under specified normal and stressful conditions.

Supporting agency address information: Md. R & D Com. (Army), Walter Reed Army Inst. Res. Washington D.C. 20012.

SUPPORTED BY U.S. Dept. of Defense - Army

6.0002, INDIVIDUAL DIFFERENCES TO SELECTED SENSORY STIMULI RELATED TO ORIENTATION & PERFORMANCE FLIGHT

F.E. GUEDRY, U.S. Navy, Aerospace Medical Inst., *Pensacola, Florida* 32512

The objective is to study inner ear function as it relates to flight safety and to determine means of applying knowledge of this function to improve Army aviation flight safety.

The approach is to determine the nature and magnitude of individual differences to selected sensory stimuli and to apply these findings in developing improved means of pilot selection, pilot indoctrination, physiological training, and medical evaluation of pilots.

Supporting agency address information: MDRDC Environmental Prot. Rsch. Div., Washington, D.C. 20314.

SUPPORTED BY U.S. Dept. of Defense - Army

6.0003, ISOMETRIC STRESS AS A PREDICTOR OF CARDIOVASCULAR DISEASE IN THE NAVAL AVIATOR

K.C. STANTON, U.S. Navy, Aerospace Medical Res. Lab., *Pensacola, Florida* 32512

Submaximal (50-70 percent) isometric contraction produced by sustained hand grasp for 2 minutes has been demonstrated to be a powerful source of cardiovascular stress. There is a great need for a simple stress test that can be performed by operational flight surgeons during the annual physical examination of naval aviators. Treadmill (or bicycle ergometer) stress testing requires a significant equipment and space investment, and is very time consuming. If isometric stress testing could be shown to be sensitive (or nearly as sensitive) as treadmill exercise testing, it could be rapidly and inexpensively implemented for routine use.

The effects of isometric stress on the standard 12-lead electrocardiogram (ECG) will be compared to the effects produced by conventional bicycle and treadmill exercise tests. Two groups of subjects will be studied using both procedures-individuals with known cardiovascular disease, and individuals who are in apparent good health. In addition to the ECG, several non-invasive methods of measuring (or estimating) cardiovascular function will be employed. These include systolic time intervals, vectorcardiograms, phonocardiograms, and electrocardiograms. These measurements will afford a comparison of the amount of stress provided by both methods.

Supporting agency address information: Naval Aerospace Medical Res. Lab., Pensacola, Fla. 32512.

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0004, NAVY ENVIRONMENT - THE ROLE OF PROSTAGLANDIN SYNTHESIS IN THE RESPONSE OF THE BRAIN TO STRESSES SUCH AS HIGH G IN OXYGEN-ENRICHED ATMOSPHERE

H.S. MICKEL, Childrens Hosp. Med. Ctr., *Boston, Massachusetts* 02115 (N00014-72-C-0059)

Effects of gravitational stress on the brain which may affect Navy pilots can result in loss of aircraft and of lives. It has been shown that the effects of this type of stress involve the prostaglandins. The investigator has found evidence that high oxygen levels such as may be used in aircraft may affect the biosynthesis of prostaglandin formation, action and degradation in the brain, and the possible consequences of the use of supplemental oxygen on this substance.

Formation of prostaglandins from a variety of probable substrates in animal brain tissue is being investigated. The effects of various factors, such as pH, oxygen tension, temperature and the like are being demonstrated. The work is carried on in collaboration with other laboratories concerned with the biochemical consequences of stress and oxygen toxicity.

Supporting agency address information: Office of Naval Research 442, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0005, PREVENTION AND TREATMENT OF DISABILITIES ASSOCIATED WITH MILITARY OPERATIONS AT HIGH TERRESTRIAL ELEVATION (22)

J.T. MAHER, U.S. Army, Research Inst. of Env. Med., *Natick, Massachusetts* 01760

Exposure of soldiers to high terrestrial elevation results frequently in reduced efficiency as well as disabilities which are incompatible with the successful completion of military operations.the purpose of this unit is to investigate methods of prevention and treatment of these performance decrements and disabilities.

Studies will be conducted in animals and man to (1) determine the mechanisms of the disorders which occur at altitude- (2) assess and predict the performance of individuals and small units functioning at altitude- (3) evaluate the efficacy of pharmacological agents and other emans in preventing or reducing performance decrements and illness- (4) enhance the rate of adapation to this environment.

Supporting agency address information: Md. R & D Com. (Army) Res. Inst., Environmental Medicine, Natick, Mass. 01760.

SUPPORTED BY U.S. Dept. of Defense - Army

6.0006, EFFECTS OF ENVIRONMENTAL STRESS ON MILITARY PERFORMANCE-INTERACTIONS WITH EXTENDED OPERATIONS, UNUSUAL ACTIVITY REST CYCLES

S.M. ROBINSON, U.S. Army, Research Inst. of Env. Med., *Natick, Massachusetts* 01760

Many environmental stresses produce prodromal and subclinical disorders prior to frank casualty occurrence. The purpose of these studies is to identify these sub-clinical disorders and to utilize critical military individual and team tasks to assess the decremental effects of adverse climatic conditions tested singly or in combination with such stressors as sleep deprivation, unusual activity-rest cycles, and rapid crossing of time zones. To identify and evaluate means to minimize potential decrements in performance effected by such stressors.

Critical military tasks will be simulated in the laboratory and performed by military personnel under environmental and working conditions similar to those encountered in the field. Group interactions, stress responses and decrements in performence will be characterized on an interdisciplinary basis bringing to bear physiological, behavioral, and biochemical studies. Tolerance limits will be established so that more effective means for reducing performance disabilities can be evaluated.

Supporting agency address information: Md. R & D Com. (army) Res. Inst., Environmental Medicine, Natick, Mass. 01760.

SUPPORTED BY U.S. Dept. of Defense - Army

6.0007, DEVELOPMENT OF PERFORMANCE MEASURES FOR SIMULATED AND REAL MILITARY TEAM TASKS (22)
S.M. ROBINSON, U.S. Army, Research Inst. of Env. Med., *Natick, Massachusetts* 01760

To develop psychophysiological, biochemical, motivational, behavioral state, group process, and task proficiency measures which are relatable to operational indices of military team performance. These measures will be used to determine the impact of environmental extremes upon group performance and individuals functioning within the group so that performance alterations and subclinical illnesses can be identified and means of treating these disorders can be evaluated.

Emphasis will be placed upon real Army teams performing their critical military tasks, studied in the laboratory with conditions similar to those in the field. Experimental data will be validated subsequently during field exercises. Tolerance limits will be determined for conditions of heat, cold, high altitude, and combinations of these stressors and strategies for reducing environmentally induced performance disabilities will be evaluated.

Supporting agency address information: MDRDC Rsch. Inst. Env. Med., Natick, Mass. 01760.

SUPPORTED BY U.S. Dept. of Defense - Army

6.0008, NAVY ENVIRONMENT - VERIFICATION OF MECHANISM FOR VERTEBRAL FRACTURES IN NAVY AIRCREWS DUE TO ACCELERATION PRODUCED DURING EMERGENCY EJECTION
A.I. KING, Wayne State University, School of Engineering, *Detroit, Michigan* 48202 (N00014-69-A-0235-0001)

This work is to develop means for preventing vertebral fractures in naval aircrews ejecting from aircraft. The research is concerned with effective repositioning of the body load on the spinal column based on the forces exerted on vertebral bodies under high onset rates of acceleration.

Specially prepared human cadavers in which the vertebral bodies have been instrumented with strain gauges are being subjected to acceleration levels and onset rates comparable to that of the Martin- Baker ejection seat. The mechanism for the strain reduction observed throughout the vertebrae when a hyperextension device is used is being investigated by study of the load bearing capabilities of joint facets. The beneficial effects of the device for a variety of seat back angles also are being determined. The data obtained from the experimental measurements is used for formulating a mathematical model to permit prediction of forces sustained by the spinal column under a variety of input conditions.

Supporting agency address information: Office of Naval Research 440B, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0009, NAVY ENVIRONMENT-EFFECTS OF HIGH AND LOW PRESSURE OXYGEN ON BLOOD AND NERVE CELLS
C.E. MENGEL, Univ. of Missouri, School of Medicine, *Columbia, Missouri* 65201 (N00014-67-A-0287-0003)

The breathing of oxygen at partial pressures greater than normal in diving is depth and time limited due to various forms of oxygen toxicity that may occur. Emphasis in this investigation is being placed on (1) elucidating the biochemical and cellular physiological processes responsible for injury to blood cells and the central nervous system, and (2) developing methods for the prevention and treatment of oxygen toxicity.

The influence of drugs, iron depletion and inert gases on susceptibility to the effects of high oxygen pressure (OHP) is being examined in mice. The roles of lipid peroxide formation and changes in carbohydrate metabolism as they relate to red blood cell and brain damage are being investigated in experiments on animals exposed to oxygen under hypo-, iso-, and hyperbaric pressures. In addition, the effects of hypoxia acid are being determined in enzymatic studies, and the role of circadian rhythms in oxygen toxicity is being investigated.

Supporting agency address information: Office of Naval Research 441, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0010, PERSONNEL TECHNOLOGY - VISUAL PROBLEMS OF PERSONNEL IN NAVY VEHICLE OPERATIONS
J.J. GIBSON, Cornell University, School of Arts, *Ithaca, New York* 14850 (N00014-67-A-0077-0005)

Assessment and prediction of the effectiveness of task performance (such as landing an aircraft on a carrier deck) of naval personnel requires adequate and accurate knowledge of human sensory systems and the range and types of environmental changes which influence performance. This work deals with the perception of motion and space which is a significant variable in naval tasks such as aircraft piloting and target tracking.

Work will be completed on data analysis and write up of experiments and writing the final report.

Supporting agency address information: Office of Naval Research 441, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0011, MULTI-LAYER MODEL ANALYSES OF THE HEAD
G.D. MOSKOWITZ, Drexel University, School of Engineering, *Philadelphia, Pennsylvania* 19104 (N62269-73-C-0689)

Better protection for aircrewmen can result from increased knowledge of how injury from a non-penetrating blow to the head is transmitted through the skull layers to the intracranial contents. Mathematical technics developed to compute stress, pressure, and energy levels in the skull-brain multi-layered model can be applied to the additional layers formed by a protective helmet.

Ultrasonic and impact experiments will be used to determine the dynamic mechanical properties of bone. These properties will be applied in computer models of the head-impact event. In addition, the electromechanical behavior of an ionic-viscoelastic gel analog of the brain will be studied as a source of mechanically evoked electropotentials.

Supporting agency address information: Naval Air Development Center, Crew Systems Dept. 4031, Warminster, Pa. 18974.

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0012, EFFECTS OF COMBINED STRESSES ON NAVAL AIRCREW PERFORMANCE
J.S. BOWMAN, U.S. Navy, Crew Systems Department, *Warminster, Pennsylvania* 18974

To study the effects of several combined stresses on aircrew performance and fatigue. It is a well-recognized fact that all of these stressful effects contribute to the fatigue of aircrew personnel, but no one has endeavored to quantify the extent to which each contributes to total fatigue, or to define the actual mechanisms by which these stresses affect the aircrews. This information becomes increasingly important due to the increases in stress found in current and proposed weapons systems, high performance attack and fighter aircraft, fixed and rotary-wing antisubmarine warfare aircraft and high-speed surface- effects vessels.

The capability for simultaneous study of the combined stresses and sustained acceleration exists uniquely on the dynamic flight simulator at the Naval Air Development Center. Physiological and performance data will be collected from personnel performing simulated aircrew tasks while being subjected to various levels of several distinct types of stress and combinations of them. This approach will provide: (1) data on the performance degradation resulting from all types of stress acting simultaneously, and (2) a quantitative estimate of impairment due to different levels of each stress taken singly.

Supporting agency address information: Bureau of Medicine & Surgery, Washington, D.C. 20372.

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0013, NAVAL AIRCREW PARAMETRIC DEFINITION AND ASSESSMENT
G.T. CHISUM, U.S. Navy, Crew Systems Department, *Warminster, Pennsylvania* 18974

To evaluate the existence of and develop the capacity for research into the behavior and performance of naval aircrews and to explore parameters which influence aircrew performance.

Colleges will be evaluated for capability to perform research in the areas of interest. Contracts for the desired research will be negotiated and monitored by NADC. Reports of the research will be prepared as appropriate.

Supporting agency address information: Naval Air Systems Command 340F, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0014, OHH AS A STRESS INDICATOR IN AIR CREWMEN

B.D. POLIS, U.S. Navy, Crew Systems Department, *Warminster, Pennsylvania* 18974

To determine O-hydroxy hippuric acid (OHH) and related molecular changes in the urine of human subjects after intentional free fall parachuting or exposure to other aerospace stress environments. The goal is to develop predictive indices for stress tolerance and to reveal the exhaustion of adaptive mechanisms and the onset of incipient or overt pathology.

Thin layer and high pressure anion exchange chromatographic techniques will be used to detect and quantitate the organic solvent soluble components extractable from acidified urine obtained from control and stressed military flight personnel. The results will be correlated with other stress indicators like blood phospholipids to achieve an objective biochemical definition of stress pathology.

Supporting agency address information: Naval Air Systems Command 310C, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0015, AIRCREW PERFORMANCE FOR READING AIRBORNE DISPLAYS BASED ON LEGIBILITY FACTORS

R.J. WHERRY, U.S. Navy, Crew Systems Department, *Warminster, Pennsylvania* 18974

To determine the effect of legibility factors on the amount of time utilized by airborne operators to read various types of visually displayed information and (b) to provide data and develop tradeoff curves to enable human engineers to predict anticipated reduction in crew performance when legibility of Navy aircraft dials and displays is hindered due to deviation from optimal display design.

A systematic exploration of such display characteristics as: (a) stroke width, (b) character size, (c) font style, (d) number of graduation marks with time-to-read as dependent variables are planned. 'subject-terminated' stimulus presentation utilizing 'time-to-read' stimuli material as the criterion will be utilized in lieu of the more traditional 'tachistoscopic presentation' with 'accuracy of report' as the criterion. This procedure is expected to yield data far more relevant to actual airborne applications. A technical problem which may tend to decelerate the work is to verify that observers read, as opposed to fixate on the stimulus materials.

Supporting agency address information: Naval Air Systems Command 340F, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0016, THE EFFECTS OF SMOKING ON PERIPHERAL VISUAL DETECTION OF MOVEMENT

N.W. HEIMSTRA, Univ. of South Dakota, School of Arts, *Vermillion, South Dakota* 57069 (DADA17-73-C-3037)

Determine effects of smoking on peripheral visual detection of movement in relation to Army aviation flight safety.

Ability of young male subjects to detect target moving into and already within the peripheral field of view will be determined under conditions of smoking, smoking deprivation, and nonsmoking. The accuracy of judgement involving prediction of motion will also be determined. Tests will be performed under two levels of illumination, simulating daylight and dusk.

Supporting agency address information: MDRDC Environmental Protection Res. Div., Washington, D.C. 20314.

SUPPORTED BY U.S. Dept. of Defense - Army

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, COMMAND AND CONTROL - TECHNIQUES FOR AUTOMATED ANALYSIS OF LARGE SOFTWARE PROGRAMS AND PROGRAMMING SYSTEMS

C.V. RAMAMOORTHY, Univ. of California, Electronics Research Lab., *Berkeley, California* 94720 (N00014-69-A-0200-1064)

The Navy has a huge investment in computer software programs but lacks definitive techniques to evaluate the efficiency and validity of software programs and programming systems. This task has the objective of developing new techniques for the evaluation and validation of large programs and programming systems through automatic analysis.

The approach includes reliability aspects of single program modules and of the complex interactions possible among sequential or simultaneous cooperating processes. The problems common to both application programs and control programs as well as some problems peculiar to each are considered. The aim is to provide partial validation of the most common and the most dangerous program errors and to provide tools for the programmer that are needed to help rid large programs of residual bugs. Task by task partial validation and debugging form the basis of a hierarchical bottom up system validation. All task interactions and interfaces are to be checked and the goal, at each level of the hierarchy, is to establish a running configuration of the software module (task, set of tasks, or total system).

Supporting agency address information: Office of Naval Research 437, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

7.0002, METHODOLOGY FOR SYNTHESIS OF INFORMATION PROCESSING SYSTEMS

G. ESTRIN, Univ. of California, School of Engineering, *Los Angeles, California* 90024 (AT(04-3)-34,PA 214)

The objective of this proposal is to extend the research program leading to improved methodology for synthesis information processing systems. This objective includes: modeling and design of computer systems; modeling and design of computer programs; modeling and design of data structures; investigation of methods for validation of those models; and investigation of methods for increasing remote host-to-host interaction through networking.

Particular subobjectives for the 1974-75 renewal year include: 1. Continued investigation of languages and methodology for formalizing characterization of inputs, outputs, transformation, cost, performace, etc. of systems to be synthesized. 2. Implementation of translators for the SL-1 structural modeling language and the FL-1 functional modeling language. 3. Extension of DCDS simulation language to permit direct simulation of FL-1 models. 4. Continue work on synthesis of reliable software with completion of work on formalization of proof techniques; completion of design of a programming language for the construction of reliable programs; design and execution of experiments to evaluate these results. 5. Modeling, design and evaluation of ensembles of microprocessors in resource sharing or cooperative modes. Investigation of languages for reliable description of hardware building blocks. 6. Extension of studies of virtual machine architectures. 7. Investigation of automated data base design, emphasizing the impact of new hardware bases and limits imposed by important structural requirements.

SUPPORTED BY U.S. Atomic Energy Commission

7.0003, COMMAND AND CONTROL - ANALYTICAL METHODS FOR PERFORMANCE ANALYSIS OF COMPUTING SYSTEMS NETWORKS

B.P. LIENTZ, Univ. of California, School of Management, *Los Angeles, California* 90024 (N00014-69-A-0200-4053)

The Navy of today is a large user of computing systems. In the near future, it will progress to networks of computers. Such network systems will bring many added efficiencies and flexibilities in the storing, accessing, and sharing of data in command and control systems. This task is to develop analytical methods for definitive evaluation of incremental improvements to such systems.

The approach is to develop methods to evaluate computer and information systems with respect to the performance criteria of vulnerability, response time, and throughput. For some of these measures new definitions are needed. The research results would then incorporate statistical sequential procedures and network analysis methods for determining critical thresholds of response time and throughput in terms of the message and job traffic, computation characteristics, and priority systems. The effort centers on vulnerability since this is an important feature of DOD systems and since vulnerability and security actions have a substantial effect on the cost, response time, and throughput of a network and structure.

Supporting agency address information: Office of Naval Research 437, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

7.0004, COMMAND AND CONTROL - VOICE COMMUNICATION WITH COMPUTERS FOR AUTOMATED DEVICE CONTROL

J.D. MARKEL, Speech Comm. Res. Lab. Inc., *Santa Barbara, California* 93109 (N00014-67-C-0118)

Automated techniques and equipments which will provide speech recognition and speech synthesis would be useful to the Navy. For example, with the proliferation of shipboard and airboard controls, use of voice actuated devices could bring about more rapid control while at the same time minimizing the actuation of wrong instruments or controls. Conversely, speech synthesis could bring into being voice warnings of equipment dangers, improper adjustments, and many other similar forms of voice information. This task is attempting to solve some of the problems which are limiting the implementation of automatic speech recognition and automatic speech synthesis equipment.

The approach is to do basic research in speech analysis and synthesis techniques which would lead to automatic derivation of acoustical parameters for automatic recognition and automatic synthesis. Emphasis in the coming year will be on techniques for developing low bit rate speech vocoders.

Supporting agency address information: Office of Naval Research 437, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

7.0005, COMMAND AND CONTROL - MULTIOBJECTIVE CONTROL THEORY

D.C. COLLINS, Technology Service Corporation, *Santa Monica, California* 90401 (N00014-73-C-0412)

In the optimization and control of naval systems one of the most critical and least understood aspects is the determination of the 'cost criterion' which is to be optimized. In many cases, such as a weapon delivery system, the various quantities which enter this function are not commensurable (for example development cast, development time, safety, reliability, etc.). Nevertheless, they are currently cast together into a scalar functional relation with respect to which the optimization takes place. This task will investigate an alternative choice of objective function which should provide improved analysis and understanding in problems with conflicting or noncommensurable criteria.

The approach will be to define a vector valued objective function. Then, rather than finding a single 'optimal' design or control policy, the optimization will give a set of 'non-inferior' alternative designs and associated values of the vector-valued objective function. A means of concise display will be deveioped to provide designers and policymakers with the general structures, advantages and disadvantages of the non-inferior solutions.

Supporting agency address information: Office of Naval Research 432, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

7.0006, COMMAND AND CONTROL - INTERACTIVE MAN-MACHINE COMMUNICATION

R.B. FETTER, Yale University, Graduate School, *New Haven, Connecticut* 06520 (N00014-67-A-0097-0010)

Operational Navy needs require the use of computer terminals and techniques in many types of applications. Little is now known about the interactive effects of the use of these various sytems in differing situations. The objectives of this research are to: (1) understand the 'mutual influence' which occurs as the computer system and the user exchange information and (2) investigate the optimization process performed by the user in his decision making.

Current efforts center around the development of a conversational modeling language (CML) which is a collection of computer programs, parameter interfaces, and linkage conventions which implement a set of commands and statements considered to be useful for constructing systems and models on a computer. CML is able to respond both to the level of programming experience of the user and to the level of demand placed on it by the user as well. This flexibility of response should prove very useful in multilevel decision making systems such as those found throughout the Navy Department and DOD.

Supporting agency address information: Office of Naval Research 437, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

7.0007, COMMAND AND CONTROL - NONLINEAR AND INTEGER OPTIMIZATION TECHNIQUES

L.S. LASDON, Case Western Reserve Univ., School of Engineering, *Cleveland, Ohio* 44106 (N00014-67-A-0404-0010)

This research is to meet the continuing demands of an increasingly complex naval force for solution of problems in the engineering, physical and management sciences which are properly formulated as nonlinear or integer optimization problems.

The research will concentrate on the development and analysis of algorithms for solving nonlinear and integer optimization problems. In the former case, the work will emphasize testing and improving a technique known as the 'reduced-gradient method', in the latter, it will emphasize group-theoretic methods of integer programming.

Supporting agency address information: Office of Naval Research 434, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

7.0008, NAVY ENVIRONMENT - MULTIDIMENSIONAL SCALING

J.B. KADANE, Carnegie Mellon University, School of Industrial Admin., *Pittsburgh, Pennsylvania* 15213 (N00014-67-A-0314-0022)

To improve the Navy's knowledge, operation capability, and control of its environment by creating improved statistical and probabilistic methods for estimating, predicting, analyzing, and modeling the Navy environment.

To conduct research to accomplish the stated objective, placing emphasis on research in multidimensional scaling methods.

Supporting agency address information: Office of Naval Research 436, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

7.0009, NAVY VEHICLE DESIGN AND CONSTRUCTION - STABILITY THEORY AND APPLICATION

J.P. LASALLE, Brown University, Graduate School, *Providence, Rhode Island* 02912 (N00014-67-A-0191-0009)

A large part of naval science and engineering is concerned with the analysis, design, and construction of systems modelled by partial differential equations. Among some recently opened applications of great theoretical difficulty are the model analysis of nuclear and chemical reactors, techniques of plasma containment, problems from the stability of structures such as flutter, etc. The objective of this task will be to investigate the stability and control of such systems.

The approach will be to obtain a greater degree of accuracy and conformance to realistic physical systems by studying the stability properties of distributed parameter systems (i.e., systems modelled by partial differential equations rather than ordinary differential equations).

Supporting agency address information: Office of Naval Research 432, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, EFFECTS OF NUCLEAR IRRADIATION ON THE ELECTRONIC PROPERTIES OF SEMICONDUCTOR MATERIALS AND DEVICES

O.L. CURTIS, Northrop Corporation, *Hawthorne, California* 90250 (DAAG39-73-C-0171)

To study the mechanisms of radiation produced displacements and ionization effects in materials by measurement of the rate of change of minority carrier lifetime, carrier mobility, and carrier concentration.

Single crystals of Si containing various dopants are irradiated with neutrons, electrons and gamma rays. Changes in resistivity and minority carrier lifetimes are correlated with type of impurity and concentration. Lifetime measurements are made using x-ray, electron beam and optical excitation methods. Transport properties of SiO2 are determined using electron-beam excitation.

Supporting agency address information: AMC HDL Systems Research Laboratory, AMXDO-RCE Semiconductor, Washington, D.C. 20438.

SUPPORTED BY U.S. Dept. of Defense - Army

8.0002, RARE EARTH IONS IN CRYSTALLINE FIELDS 2099

R.A. SATTEN, Univ. of California, School of Letters, *Los Angeles, California* 90024 (DA-ARO(D)-31-124-71-G67)

To study vibronic spectra to gain information about phonons and the electron-phonon interaction. This work is essential to an understanding of nonradiative transition rates for localized electrons. These rates govern the performance of the system as a laser. Thus, this work has a high relevancy to the Army's Solid State Laser Program. Understanding of rare earth ion spectra is needed for further advances in laser image converter technology.

Studies include- (1) vibronic spectra particularly as a new method of studying the density of phonon states, (2) raman effect in crystals for lattice dynamics calculations using optical spectra, and (3) the origin of unlabeled spectral lines.

Supporting agency address information: OCRD Research Office, Durham, Durham, N.C. 27706.

SUPPORTED BY U.S. Dept. of Defense - Army

8.0003, COMMUNICATIONS - ULTRAVIOLET ABSORPTION AND HIGH FREQUENCY COMMUNICATIONS

G.L. WEISSLER, Univ. of Southern California, School of Letters, *Los Angeles, California* 90007 (N00014-67-A-0269-0014)

Navy needs in high frequency communications via the ionosphere and ballistic missile phenomenology can be supported by research in atmospheric ionization processes. The objective is to measure the far ultraviolet photon gas absorption coefficients for excited molecules, particularly atmospheric constituents such as oxygen and nitrogen. Ultraviolet absorption processes are the major energy source in the upper atmosphere. To predict the radiation from gases in many situations of practical importance, involving flames, discharges, afterglows, shock fronts, or hypersonic flows, detailed cross-sections for the production and destruction of specific vibrationally and electronically excited states are needed.

Work will consist of measurement of far ultraviolet absorption coefficients for the oxygen molecule in various excited states. Techniques will be developed for the measurement of the concentration of oxygen in these excited states, so that absolute rather than relative cross-sections can be obtained. An analysis of the oxygen molecule absorption spectrum in the region 1100A to 1300A will, also, be made. Similar work will be carried out on carbon monoxide and carbon dioxide from 600A to 1000A and from 600A to 2100A, respectively.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0004, SURVEILLANCE - VERY HIGH FREQUENCY ACOUSTIC DEVICES

B.A. AULD, Stanford University, School of Humanities, *Palo Alto, California* 94305 (N00014-67-A-0112-0001)

The primary objective is to study the behavior of bulk and surface acoustic waves in inhomogeneous anisotropic media so that acoustic wave devices might be employed for signal processing.

Light incident on a photoconductor tends to short out the conduction electrons. Therefore light can be shone in a grating pattern on a thin film of photoconductive material to set up a varied electric field. If this film has been deposited on a piezoelectric substrate, it will affect the electric field of the substrate, and therefore modify an acoustic wave propagating in the substrate. This phenomena, and others, are employed to deflect and focus acoustic waves.

Supporting agency address information: Office of Naval Research 468, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0005, MATERIAL SUPPORT TECHNOLOGY - PROPERTIES OF SUPERCONDUCTING MATERIALS AND SUPERFLUID HELIUM

F. BLOCH, Stanford University, School of Humanities, *Palo Alto, California* 94305 (N00014-67-A-0112-0047)

The development of new superconducting materials and new uses of superfluid helium in naval surveillance, propulsion, and communications systems will rely on increased understanding of the phenomena of superconductivity and superfluidity. Low dissipation-high power communications systems and low-loss electrical machinery are examples where increased understanding is necessary for future developments.

The investigator is making use of a newly developed approach to the theory of many-body boson systems to study the quantum fluid phenomena of superconductivity and superfluidity. This field theory technique will be applied to problems of interacting boson systems such as the theory of helium films. Additionally, efforts will continue to develop understanding of these phenomena using general principles of physics rather than assuming some microscopic model for the boson systems.

Supporting agency address information: Office of Naval Research 422, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0006, COMMUNICATIONS - OPTICAL AND ACOUSTIC WAVE RESEARCH-JSEP

M. CHODOROW, Stanford University, School of Humanities, *Palo Alto, California* 94305 (N00014-67-A-0112-0039)

To provide the Navy the technological basis for improved solid state electronic components and devices for communications, surveillance, navigation and information handling by taking advantage of vast expertise available at institutions of recognized standing such as this one under the Joint Services Electronics Program (JSEP). The study of optical and acoustic waves in solids and their interaction with external fields leads to advanced delay lines, acoustic imaging devices, signal processors and acoustic rotation sensors.

The subject emphasis at Stanford Microwave Laboratory is acoustic microwaves and optics. Projects include range-gated optical imagers using picosecond pulses, a scanning optical microscope having many of the advantages of the scanning electron microscope and better resolution than other optical microscopes, acoustic imaging devices for underwater viewing

and nondestructive testing, signal processing such as convolution or bandwidth compression with acoustic waves, acoustic pumping of fluids, rotation sensing using acoustic waves and theoretical studies of acoustic waves.

Supporting agency address information: Office of Naval Research 427, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0007, ENERGY CONVERSION - MICROWAVE SUPERCONDUCTING RESONANT CAVITIES AT EXTREMELY LOW TEMPERATURES AND HIGH RADIO FREQUENCY POWER LEVELS

W.M. FAIRBANK, Stanford University, School of Humanities, *Palo Alto, California* 94305 (N00014-67-A-0112-0076)

The Navy needs new high power, low loss systems for transport, storage and retrieval of large quantities of radiofrequency power for immediate use. Specifically, this work will develop and use superconducting materials and processing equipment in the design, fabrication and test of superconducting resonant cavities for high power radiofrequency and microwave applications.

Investigations will be made of radiofrequency and microwave properties of superconducting resonant cavities which relate to the surface resistance of superconductors, magnetic breakdown of the superconducting state, and electron loading phenomena. Measurements will be made as a function of temperature, frequency, radiofrequency power level, magnetic field strength and other variables.

Supporting agency address information: Office of Naval Research 422, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0008, MATERIAL SUPPORT TECHNOLOGY - CONTROL OF IMPURITIES IN THE EPITAXIAL GROWTH OF HIGH QUALITY GAAS

D.A. STEVENSON, Stanford University, Center For Materials Research, *Palo Alto, California* 94305 (N00014-67-A-0112-0082)

The Navy has use for gallium arsenide electronic devices in microwave communications and surveillance systems. This program will investigate the control of residual impurities and electrically active centers in the synthesis of high purity epitaxial gallium arsenide.

The investigators will analyze the thermal-chemical reactions in a controlled growth system to determine the source of impurities, correlate the residual impurity with gas species, and modify the reactions accordingly.

Supporting agency address information: Office of Naval Research 427, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0009, COMMUNICATIONS - ATOM-ATOM SCATTERING CROSS-SECTIONS FOR EVALUATING RADIO-COMMUNICATIONS EFFECTS

M.A. LESTER, Internat. Bus. Machines Corp., *San Jose, California* 95114 (N00014-72-C-0244)

The objective is to evaluate radio-communications via the ionosphere used in Navy operational circuits. The ionization of atoms by electron impact and the scattering of electrons and ions by atoms and molecules are processes governing radio transmission, including black- out effects. The present work develops calculational techniques to estimate such ionization and scattering interactions for both the normal and disturbed atmosphere. The work also has applications to the estimation of ballistic missile signatures in an atomic weapons' environment.

Work will consist of calculations of atom-atom and atom-molecule cross-sections. Energy exchange between internal degrees of freedom of molecules due to atom-molecule impact will be examined. Computations will be made using intermolecular potentials of collisions for both reactive and non-reactive systems.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0010, SURVEILLANCE - RESONANCE RAMAN SCATTERING

R.K. CHANG, Yale University, School of Engineering, *New Haven, Connecticut* 06520 (N00014-67-A-0097-0005)

In communications, surveillance, and countermeasures, frequency agility is an important consideration for lasers in naval applications. While the number of frequencies available from well-engineered lasers is quite limited, the use of frequency shifters to be used with them affords a much greater frequency choice capability.

This work is intended to produce that capability by the use of resonance raman scattering. The resonance raman effect in semiconductors is investigated. Studies of GaP, Si, CdS(1-x)Se(x) have been made and further studies in copper halides and aluminum salts will be made. An investigation of electron-phonon coupling in HgCd(1-x)Te(x) will also be made by this technique since this coupling is important in its behavior as a detector.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0011, ENERGY CONVERSION - ENERGY RECOVERY TECHNIQUES OF A FUSION PLASMA IN ENERGY CONVERTERS FOR NAVAL POWER SOURCES

C.L. COWAN, Catholic University of America, School of Arts, *Washington, District of Columbia* 20017 (N00014-67-A-0377-0015)

This research is part of the Navy power program to define the application of fusion power to existing and projected naval power requirements. Special problems for the transformation of fusion energy to electrical power will be investigated.

Resonant energy recovery techniques for a fast theta pinch will be studied to develop the limiting parameters and to define an experimental approach for direct conversion of fusion plasma energy to electrical power. To develop the energy conversion limiting parameters, the fusion mechanism of various mixtures and densities of deuterium-helium 3 near the resonance cross section will be analyzed. Energy loss mechanisms of the high energy plasma will be studied to help determine conversion configurations which are compatible with naval power requirements.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0012, SURVEILLANCE - ATOMIC SPECTROSCOPY IN BEAMS OF ALIGNED IONS

UNKNOWN, U.S. Atomic Energy Commission, *Washington, District of Columbia* 20545

The analysis of phenomena associated with nuclear weapons explosions, laboratory plasma physics experiments, and solar energy emissions requires knowledge of the emissions of ionized atomic species. This knowledge of the atomic properties of ionized species is needed to evaluate energy loss rates and mechanisms, energy conversion processes, and provide diagnostic measurements for various types of plasma research. This research will utilize a unique technique to obtain such information which is impossible or difficult to obtain in other ways.

When beams of singly charged ions pass through solid or gaseous matter, more highly charged ions in various states of excitation are produced. But, more important, these new ion states are aligned or polarized relative to the beam direction. Such ions offer unique opportunities for studying their properties as well as analyzing the interaction mechanisms between ions and atoms. The investigator will study various species of ions for resultant alignment and then measure precise values for atomic properties by using radio-frequency techniques and effects of magnetic fields. Laser radiation will be used to excite various states in the ions of the beam and then level crossing measurements will be performed.

Supporting agency address information: Office of Naval Research 422, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0013, MATERIALS SUPPORT TECHNOLOGY - RAMAN SCATTERING
L.W. DAVIS, Univ. of Idaho, School of Letters, *Moscow, Idaho* 83843 (N00014-72-A-0232-0001)

To support the technology of electrooptical systems design with materials, components, and data by an investigation of the interactions between light and non-conducting solids. These interactions, which take place via the atomic vibrations, govern the operation of solid state lasers, infrared detectors, frequency converters, and other nonlinear optical devices.

The general reaction between light and atomic vibrations in insulating solids or molecular gases is studied experimentally. The special case of light scattering by electrically polarized dielectrics is included. Raman scattering studies in semiconductors are interpreted in terms of the electron-phonon interaction. Vibrational modes first excited by infrared laser light are probed with visible radiation.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0014, COMMUNICATIONS - PLASMA STABILITY AND HIGH-FREQUENCY COMMUNICATIONS
M.B. LEWIS, Northwestern University, School of Technology, *Evanston, Illinois* 60201 (N00014-67-A-0356)

The objective is to carry out research on plasmas and their interaction with electromagnetic fields. Such interactions are important that, for example, the application of magnetic fields to moving plasmas provides a means of converting the thermal energy of combustion of fission directly to electrical power without the use of mechanical generators. Also, plasma stability and confinement govern the possibility of thermonuclear fusion power generation. Further ionization effects in plasmas are important for radio frequency communications and telemetry from space and re-entry vehicles. The work is thus of interest to the Navy in communication systems via the ionosphere, power sources, in ballistic missile and atomic weapons effects, satellite surveillance, and in gaseous electronic devices.

Ongoing work involves studies of radiative transfer in plasmas to determine the absorption and emission of energy both at the macroscopic and internal levels. The problem of thermal fluctuations in hydrodynamics is being examined; namely, the possibility of constructing equations that include fluctuations of the variables, number density, velocity, and internal energy. Work is continuing on the ionization of a weakly ionized gas produced by a strong electric field.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0015, SURVEILLANCE - PHOTOCONDUCTIVITY OF SEMICONDUCTORS FOR SENSITIVE DETECTION OF LIGHT AND HEAT RADIATION FROM HOT TARGETS
H.Y. FAN, Purdue University, School of Science, *Lafayette, Indiana* 47907 (N00014-67-A-0226-0015)

To provide the Navy with basic materials and knowledge for improved photoconductive devices for radiation detection and surveillance. Such devices are used for both guidance and detection of missiles, visual display, night vision, infrared scanning photography, and laser detectors.

Photoconductivity, the increase in electrical conductivity of a material when it is exposed to light, is studied experimentally down to helium temperatures in semiconducting materials like InSb, ZnTe, and GaSb. The dependence of photoconductivity on materials, wavelength, temperature, impurities, and applied magnetic field is investigated. The important photoconductive mechanisms of carrier excitation, trapping, recombination, and interaction with the crystal lattice may be better understood as a result of these measurements. The simultaneous detection of two photons which together produce the same effect as one photon of twice the frequency is studied by absorption and photoconductivity. Spontaneous and stimulated emission from Landau levels produced by applied magnetic fields are investigated.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0016, SURVEILLANCE - CARBON MATERIALS AND THERMOELECTRIC POWER DEVICES
S. MROZOWSKI, Ball State University, Graduate School, *Muncie, Indiana* 47306 (N00014-74-A-0349-0001)

This research has as its objective the development of materials applicable to thermoelectric power devices, electronic circuits and in nuclear reactors used by the Navy in its surveillance operations, communications and for material support and technology.

To determine the useful properties of the graphitized carbon an elaborate technique for making reproducible specimens has been developed. This is of basic importance since the behavior of these materials is otherwise unpredictable. Measurements of their magnetic susceptibility, electrical resistivity, Hall coefficients, microstructure, thermal conductivity, thermoelectric power, optical properties and paramagnetic resonance will be carried out.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0017, SURVEILLANCE - STUDY OF X-RAYS EMITTED FROM HIGHLY IONIZED ATOMS
B. CURNUTTE, Kansas State University, School of Arts, *Manhattan, Kansas* 66502 (N00014-67-A-0403-0002)

The Navy has interest in phenomena involving highly ionized atoms and their interaction with electromagnetic interaction and with other particles. These phenomena occur in nuclear weapon explosions, solar flare and sunspot activity, and some laboratory plasma devices involved in energy conversion research. This research will study emission of X- rays from highly ionized heavy ions to clarify the results and mechanisms for producing long lived metastable states in few electron, high atomic-number ions.

When singly charged ions having energies of tens of MeV pass through thin foils, they emerge stripped of all or nearly all of their atomic electrons. Frequently, the inner shells have vacancies which can be filled, coincident with emission of an X-ray. In certain configurations of the electrons, decay by X-ray emission is inhibited by selection rules which result in decays several orders of magnitude slower than is usually observed. X-ray and elctron spectrometers are used to detect emissions downstream from the foil to measure lifetimes and energies of excited few electron states in heavy ions. The systematics of formation and decay of k-shell vacancy states in multiply charged high z atoms will be studied in a variety of species. X-ray measurements will be supplemented by Auger electron measurements to improve efficiency and reduce uncertainties in identification.

Supporting agency address information: Office of Naval Research 422, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0018, ENERGY CONVERSION - ENERGETICS OF TURBULENT HEATING A PLASMA IN ENERGY CONVERTERS FOR NAVAL POWER SOURCES
A.W. DESILVA, Univ. of Maryland, School of Arts, *College Park, Maryland* 20740 (N00014-67-A-0239-0015)

This research is part of the Navy power program to define the feasibility of fusion power for existing and project naval power requirements. This will be accomplished through research using high temperature plasma experiments and the appropriate plasma diagnostics. Plasma theory and computer simulation will be utilized, where appropriate, to converse resources. Jointly available facilities and personnel at the Univ. of Maryland, Cornell Univ. and the Naval Research Laboratory will be fully utilized as will the resources of other agencies to increase the breadth of naval fusion power research.

Fusion power feasibility for naval applications will be established by heating and confining a fusion plasma for sufficient time to realize a net power gain. Generation of a large volume of dense plasma with ion temperatures in the 10 to 60 KeV range will be continued to experimentally determine the turbulent heating interactions of a rapidly rising theta pinch magnetic field. This research will (1) investigate the limits of ion temperature and plasma density attainable through increasing input energy, (2)

study reaction rates in a fusion plasma and (3) study the decay of the ion heating mechanism by confining the plasma to determine if the heating will jeopardize containment. Special problems for the transformation of plasma energy to electrical power will be included.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0019, ENERGY CONVERSION - ELECTRON SCATTERING

G.A. PETERSON, Univ. of Massachusetts, School of Arts, *Amherst, Massachusetts* 01002 (N00014-67-A-0230-0009)

Knowledge of the detailed structure of nuclei and nuclear forces is required in design and analysis of nuclear weapons, nuclear energy sources, radiation effects, and studies of solar phenomena. This task will utilize newly evolved techniques and apparatus to provide new or improved information on the structure and charge distribution of nuclei using the scattering of fast electrons. The objective is to better understand and predict the effects of nuclear radiations or particles interacting with matter.

Precision measurements will be made on the scattering of electrons from helium-3 and the deuteron and the electro-disintegration of these nuclei. These results will provide better understanding of their structure and also a test for various phenomenological nucleon-nucleon potentials. A multi-wire proportional counter will be tested for use on experiments at the MIT linear accelerator. Analyses of data accumulated in several experiments will be completed. Electron backscattering experiments on several nuclei will be carried out. These interactions involve only the magnetic properties of the nucleus and thus resolves some of the complexity of the interactions.

Supporting agency address information: Office of Naval Research 422, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0020, MESON PROPERTIES AND DOUBLE ELECTRON PAIR PRODUCTION

R. WEINSTEIN, Northeastern University, School of Liberal Arts, *Boston, Massachusetts* 02115

This group will be engaged in a study of the properties of strong interactions in a series of experiments at the Fermi National Accelerator Laboratory. The parts of the program include: 1. Study of the mass spectrum of known and conjectured meson states in the energy range of 2 to 10 GeV/c2 produced in the collisions of 200 GeV/c hadrons with protons. 2. A study of the inclusive cross sections hadron plus nucleon yields nucleon plus anything at 200 GeV/c. 3. Measurement of pp elastic scattering in the few hundred GeV/c range at high momentum transfer. 4. Measurement of various elastic and inelastic cross sections at moderate momentum transfer using the single arm spectrometer.

This work is a continuation of that currently supported by Foundation grant number GP-25307, Amendment Number Four.

SUPPORTED BY U.S. Natl. Science Foundation

8.0021, WEAPONRY - ATMOSPHERIC ABSORPTION LINES SHAPES IN THE INFRARED

A. JAVAN, Mass. Inst. of Technology, School of Science, *Cambridge, Massachusetts* 02139 (N00014-67-A-0204-0077)

The objective of this effort is to study experimentally and theoretically the shapes of water vapor absorption lines in the atmosphere. The emphasis is in the line profile well removed from line center where the absorption is expected to be lowest. This effort will assist the Navy in its assessment of the potential of lasers for a variety of Navy weaponry applications.

The contractor will conduct a theoretical study of line shapes derived from accurate computer calculations of molecular trajectories averaged over an ensemble of collisions. The results will be compared with high resolution experimental results derived using tunable laser sources and the techniques of nonlinear spectroscopy.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0022, POSITRON, ELECTRON AND PHOTON EXPERIMENTS

S. BERKO, Brandeis University, Graduate School, *Waltham, Massachusetts* 02154

Research previously supported by NSF Grant No. GH-40093X concerning experiments designed to study various aspects of the electronic properties of solids using positron annihilation techniques will be continued. In particular, experiments on the electronic momentum distributions, especially Fermi surfaces, of disordered metal alloys will be extended using a newly constructed two dimensional angular correlation apparatus. New experiments studying the activation energy of vacancies in metals and the vacancy-impurity interaction in alloys using positron lifetime measurements will be undertaken. Investigations on the surface interactions of positrons and positronium will also be made.

SUPPORTED BY U.S. Natl. Science Foundation

8.0023, RESEARCH IN ELEMENTRARY PARTICLE PHYSICS

L.E. KIRSCH, Brandeis University, School of Science, *Waltham, Massachusetts* 02154 (AT(11-1)-3230)

The experimental project is primarily a high statistical measurement of the reaction proton-antiproton yields V zero-meson-anti V zero meson plus neutrals using the Multiparticle Spectrometer at Brookhaven. The full analysis of this reaction including the polarization of the Vo's should provide tests to various dynamical models.

The theoretical project is an exploration of the relationship of Yang- Mills theories to dual resonance models. The computational technique will be the development of a Hartree approximation, or spherical model limit, so as to be suitable for renormalizable non- Abelian gauge theories.

Results: 1. Apparatus is under construction. 2. It was shown that the non-Abelian gauge vector mesons, of a renormalizable Yang-Mills theory, lie on Regge trajectories. The Hartree approximation has been formulated for relativistic lambda Phi4 theory.

SUPPORTED BY U.S. Atomic Energy Commission

8.0024, NAVY ENVIRONMENT - CHARGED PARTICLE PRODUCTION OF NEUTRONS IN SHIELDING MATERIALS

A. GALONSKY, Michigan State University, School of Natural Sciences, *East Lansing, Michigan* 48824 (N00014-68-A-0109-0008)

Radiations from nuclear weapons, power systems, and solar phenomena can produce deleterious effects on Navy systems. This research will investigate the mechanisms by which neutrons are produced by charged nuclear particles impinging on solid materials in order to clarify radiation effects and shielding problems.

The investigator is studying the production of neutrons resulting from the interaction of protons with various nuclei. Facilities for accurately detecting neutrons in a time-of-flight technique have been developed to allow angular distributions to be measured with high efficiency and low background. Analysis of these neutron spectra for reactions involving single neutron emission will be made to deduce details of the two body force in nuclei. By choosing appropriate nuclei, the effects of nuclear structure can be minimized, so that the interaction can be determined. Subsequently, this knowledge can be used to study the specific structural properties of atomic nuclei.

Supporting agency address information: Office of Naval Research 422, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0025, ENERGY CONVERSION - MASS SPECTROSCOPY

W. JOHNSON, Univ. of Minnesota, School of Physics, *Minneapolis, Minnesota* 55455 (N00014-67-A-0113-0018)

Many Navy power systems make use of the nuclear processes of fission, nuclear reactions, and radioactive decay. These processes are directly dependent on the atomic masses of the nuclear species since the energy released is directly related to the difference in masses of the nuclides involved. A systematic study

of known nuclides provides insight into properties of nuclides which are unstable, yet to be discovered, or artificially produced.

By coupling a high sensitivity mass spectrometer to a particle accelerator it will be possible to measure directly the masses of short lived radioactive species produced in nuclear reactions or fission. Adding these results to those obtained for stable isotopes of the rare- earths, will provide the systematics necessary to predict the properties of other unstable nuclei for which measurements are impossible, such as nuclei far from the line of stability. New techniques for improving the precision and sensitivity of mass spectrographs will be developed or extended using new electronics and computer capabilities.

Supporting agency address information: Office of Naval Research 422, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0026, ENERGY CONVERSION - LITHIUM BEAM PLASMA DIAGNOSTICS
K.J. NYGAARD, Univ. of Missouri, School of Arts, *Rolla, Missouri* 65401 (N00014-69-A-0141-0007)

This research is a part of the Navy Power Program to determine the feasibility of fusion power to meet existing and projected naval power requirements.

The capabilities of an atomic lithium beam as a diagnostic method to determine plasma density as a function of space and time will be investigated. This work will include a detailed study of an atomic beam as a plasma diagnostic technique, experimentally measuring the total electron ionization cross section in lithium, construction of a lithium beam apparatus consisting of a source and detector, and demonstrate the practical application of the lithium beam method for plasma where the limits of known diagnostic techniques are understood.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0027, COMMUNICATIONS - PLASMA IONIZATION AND HIGH FREQUENCY COMMUNICATIONS
R.L. LIBOFF, Cornell University, School of Electrical Engin., *Ithaca, New York* 14850 (N00014-67-A-0077-0015)

The objective is to carry out research on plasmas and their interaction with electromagnetic fields. Such interactions are important in that, for example, the application of magnetic fields to moving plasmas provides a means of converting the thermal energy of combustion or fission directly to electrical power without the use of thermonuclear fusion power generation. Further ionization effects in plasmas are important for radio frequency communications and telemetry from space and re-entry vehicles. The work is thus of interest to the Navy in communication systems via the ionosphere, power sources, in ballistic missile and atomic weapons effects, satellite surveillance, and in gaseous electronic devices.

Work consists of an examination of the fields excited in a closed cavity by high-velocity particles. The energy in the wake field, namely, the energy which the particle loses to the field it has excited in the cavity, will be calculated. The instability of the beam due to its self- electric field will be investigated and the behavior due to an external magnetic field and due to the ions produced by the beam interacting with the ambient medium will also be considered. The equilibrium of electromagnetic fields in cavities will be studied thermodynamically, kinetically, and electrodynamically.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0028, SURVEILLANCE - OPTICAL AND ELECTRONIC PROPERTIES OF ALKALI HALIDES
H. MAHR, Cornell University, School of Arts, *Ithaca, New York* 14850 (N00014-67-A-0077-0019)

This research is concerned with determining the detailed effects of ultraviolet and infrared radiation on various materials, including the alkali halides, used by the Navy as components in information storage units, radiation detection, generation devices and amplifiers, in its surveillance and material support technology.

Ultraviolet and infrared sources of radiation are used to excite impurity centers in alkali halides and cause them to luminesce. The resulting emitted radiation is analyzed, yielding structural and dynamic information about these materials. The exciting radiation is obtained from conventional discharge sources, from laser sources and from harmonic generation in the latter. There is much interest in sources of radiation and in laser materials with consideration given to generation from high energy electron beams. Materials under study include pure, mixed and defected alkali halides but is also directed to laser liquids.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0029, COMMUNICATIONS - OPTICS THEORY
M. LAX, City University of New York, School of Liberal Arts, *New York, New York* 10031 (N00014-72-A-0406-0003)

The interaction of light and sound with condensed matter plays a central role in a number of devices of interest to the Navy, such as display devices and laser elements.

This work examines theoretically the basic interactions and attempts to firm up our understanding of the interactions in a unified way. A Lagrangian approach is used with careful attention paid to rotational invariance for both linear and non linear interactions, primarily in ferroelectric (and pyroelectric), and magneto-electric materials. Also quantum noise techniques developed previously will be applied to transmission lines.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0030, THEORETICAL HIGH-ENERGY PHYSICS
T.D. LEE, Columbia University, School of Arts, *New York, New York* 10027 (AT (11-1)-2271)

The investigations of the Columbia Theoretical Group have been and will continue to be concerned with all theoretical aspects of high- energy physics. Our main efforts will lie in the area of particle physics, scattering processes, symmetry principles and field theory, including their extensions to related problems in atomic and nuclear physics, astrophysics and statistical mechanics. We shall continue our close relationships with groups carrying out experiments at Columbia, Nevis, Brookhaven, Argonne, NAL and CERN. We shall attempt to maintain a broad view of the prospects of high-energy physics which may be useful in the future determination of national scientific policy.

SUPPORTED BY U.S. Atomic Energy Commission

8.0031, HIGH-RESOLUTION OPTICAL MEASUREMENTS, ATOMIC HYPERFINE STRUCTURE AND ISOTOPE SHIFT
H.H. STROKE, New York University, School of Arts, *New York, New York* 10003

The research is a continuation of a systematic study, through the electron-nuclear interaction, of the nuclear electric and magnetic structure of isotopes of heavy elements, in the region of the doubly- magnetic nucleus Pb2O8, with the use of techniques allowing very small samples to be utilized. The results are of importance to the development of theories of nuclear magnetization and to an understanding of nuclear interactions as manifested by variations of the nuclear charge radius. New instrumentation and techniques are under development to extend the capabilities of these experiments. The facilities are also used in studies of atomic and radiation processes.

This work represents a continuation of that currently supported by Foundation grant GP-15258, Amendment 02.

SUPPORTED BY U.S. Natl. Science Foundation

8.0032, EXPERIMENTAL STUDIES AT LOW TEMPERATURE
D.H. DOUGLASS, Univ. of Rochester, School of Arts, *Rochester, New York* 14627

The experimental program supported by NSF Grant GH-40164 will be continued but only in the area of high temperature superconductivity. Work on Nb3Ge will be extended to understand the effects of substrate temperature, deposition rate, and degree of disorder in the sputtered films. The V3X, where X equals Al, Ga, Si, Ge, B, C, and P will be studied using sputtering techniques. The Nb3 X, where X equals Al, Ge, Ga, Si, and P will also be studied for the effects of substrate temperature and especial emphasis will be given to the Nb3 Al - Nb3 Ge pseudo binary system. The pseudo binary system HfC-TaC-WC will be investigated for the effects of the 'soft' phonon of HfC. Finally, some work on the mechanical properties of glassy metals, V-B and Ti-B will be studied in collaboration with Professor J. Li. These materials have low densities but high strength.

SUPPORTED BY U.S. Natl. Science Foundation

8.0033, RESEARCH IN THEORETICAL NUCLEAR PHYSICS
G.E. BROWN, State University of New York, School of Arts, *Stony Brook, New York* 11790 (AT(11-1)-3001)

The proposed work covers a broad range of topics in theoretical nuclear physics. Primary emphasis is placed on the construction of the free nucleon-nucleon interaction from field theoretic considerations which retain close contact with other relevant data (e.g. pion-nucleon at pion-pion scattering and nucleon electromagnetic form factors). Using many-bo techniques this free interaction is used to construct an effective interaction between nucleons in nuclei and a variety of calculations of the properties of nuclei are to be performed. Calculations of the properties of infinite nuclear systems and of nuclear matter at high densities with particular attention to the phenomenon of pion condensation are proposed.

SUPPORTED BY U.S. Atomic Energy Commission

8.0034, RESEARCH IN ELEMENTARY PARTICLE THEORY
K.C. WALI, Syracuse University, Graduate School, *Syracuse, New York* 13210 (AT(11-1)-3533)

The proposed research covers the following areas of great interest: (1) study of monopole theories and their quantization; (2) dual resonance models; spontaneous symmetry breaking in dual resonance models; (3) phenomenology of inclusive reactions; (4) various aspects of gauge theories; breakdown of scaling; (5) current and constituent quarks; (6) Regge analysis for reactions with arbitrary spin external particles.

We hope that our efforts in the above areas will bring about an increased understanding of elementary particles and their interactions.

SUPPORTED BY U.S. Atomic Energy Commission

8.0035, NUCLEAR AND ATOMIC COLLISION PROCESSES WITH TANDEM AND CYCLOGRAAFF BEAMS
E. MERZBACHER, Univ. of North Carolina, School of Liberal Arts, *Chapel Hill, North Carolina* 27514 (AT-(40-1)-2408)

Polarized protons will be used in polarization transfer experiments studies of giant dipole resonances, and experiments on isospin forbidden analog resonances. Polarized deuterons will be used for fluctuation studies in elastic scattering and deuteron-induced reactions and for polarization transfer measurements. Ion source development work will concentrate on increasing polarized particle currents. Calculations on nuclear structure and reaction theory will deal with deuteron scattering potentials, fluctuation phenomena, compound-elastic effects in deuteron scattering, widths of isospin forbidden resonances, shell model form factors for transfer reactions, interactive DWBA codes, and heavy-ion interactions. High-resolution X ray studies in energetic ion-atom collisions will emphasize satellite structure in its dependence on projectile Z and energy. Successful approaches to the theory of multiple inner-shell vacancy production will be studied theroretically, and proper quantum mechanical descriptions will be developed.

Results: All results from this complex project have been or will be published in the literature. A full bibliography is contained in the Progress Report for the current contract period.

SUPPORTED BY U.S. Atomic Energy Commission

8.0036, COMMUNICATIONS - CONDUCTIVITY AND OPTICAL EFFECTS IN ANISOTROPIC SEMICONDUCTORS
J.F. SCHETZINA, Univ. of North Carolina, School of Liberal Arts, *Raleigh, North Carolina* 27607 (N00014-72-C-0343)

This work on the electrical transport and photovoltaic effect in semiconductors is applicable to the development and improvement of electronic devices, optical switching and electrical instrumentation used by the Navy in its communications operations.

It is proposed to investigate excess carrier transport effects (conductivity due to electrons and holes) in anisotropic semiconductors over a wide temperature range and under varying conditions of photoexcitation. Effects due to stress and variation of light intensity will also be examined.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0037, NUCLEAR STRUCTURE RESEARCH AT THE TRIANGLE UNIVERSITIES NUCLEAR LABORATORY
L.W. SEAGONDOLLAR, Univ. of North Carolina, School of Physical Sciences, *Raleigh, North Carolina* 27607 (AT(40-1)-3624)

The Triangle Universities Nuclear Laboratory is jointly staffed by physicists from Duke University, the University of North Carolina at Chapel Hill and North Carolina State University at Raleigh. The proposed work is continuation of the work of the NCSU-R group. Work will be done in collaboration with physicists from the other two institutions as well as with others in the NCSU-R group. Programs proposed are: a) gamma ray spectroscopy in the low medium mass region; b) high resolution studies of the fine structure of analog states, statistical properties of the widths and spacings of the compound nuclear resonances and gamma-ray decay of resonant states; c) study of the L subshell ionization cross sections for heavy elements; d) study of the (Z plus 1) K X-rays caused by the proton bombardment of heavy elements; e) time-of-flight measurement of neutron cross sections of interest to the controlled thermonuclear reactor program in the energy region 9-15 MeV; f) measurement of absolute charged particle reaction cross sections of interest to the controlled thermo-nuclear reactor program and g) studies of giant resonances via radiative capture reactions using polarized beams.

Results: Publications of the past year are: Multi-Channel Study of the Fine Structure of an Analog State in 55-Mn; A Study of Low-Lying Levels in 59-Ni; A Study of the L and M X-rays of Pb Produced by O.5-14 MeV Protons; A study of Low-Lying Levels of 53-Fe; High-Resolution Proton Scattering on 50- Ti; Note on High Resolution Measurements with a Tandem Accelerator; High- Resolution Study of the 1/2 ions Analog State in 93-Tc; The Fine Structure of Analog States; Electromagnetic Decay of Fragmented Analog States.

SUPPORTED BY U.S. Atomic Energy Commission

8.0038, COMMUNICATIONS - AL BASE RARE EARTH AND TRANSITION METAL ALLOYS FOR PERMANENT MAGNET MATERIALS
H. OESTERREICHER, Oregon Grad. Ctr. Stu. & Res., *Beaverton, Oregon* 97005 (N00014-68-A-0461-0002)

This research has as its objective the development of new permanent magnet materials of high coercivity and magnetization useful to the Navy in its communications and surveillance operations as components in electronic equipment, magnetic detectors, compact motors and magnetic devices.

Aluminum-base rare earth alloys will be synthesized to determine their properties as high quality permanent magnet materials. X-ray diffraction, Mossbauer and magnetic susceptibility measurements will be made to determine their internal structure and

the means of increasing their coercivity, magnetization and stability.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0039, ENERGY CONVERSION - INTERACTION OF PI MESONS WITH NUCLEI

L.W. SWENSON, Oregon State University, School of Science, *Corvallis, Oregon* 97331 (N00014-67-A-0369-0010)

The Navy is interested in nuclear energy sources such as weapons, controlled fusion, and solar phenomena. This research will provide new information about the nuclear properties and interactions which affect the development or understanding of these energy sources. In addition, the interaction of radiation with matter will be better understood as knowledge of nuclear structure and nulcear forces improves.

The investigator is preparing instrumentation for carrying out an experimental program at the Los Alamos Meson Physics Facility, using the high quality, high intensity pi meson (pion) and proton beams which will be available there. He will measure elastic and inelastic cross sections for the interaction of pions and protons with a variety of target nuclei. As this research program is rather comprehensive in its studies of the pion-nucleus interaction and of nuclear structure, several goals are specified: (1) scattering of pions and protons from various isotopes to study theoretical models for scattering, models for nuclear structure, and differences in proton and neutron distributions. (2) pion double-charge-exchange reactions to study nuclei which cannot be studied any other way. Several, very careful, experiments will be carried out on carbon and oxygen targets to test tune-up procedures for the beam-lines and particle spectrometers in addition to collecting more precise data on pion-nucleus reactions in these nuclei than is presently available.

Supporting agency address information: Office of Naval Research 422, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0040, COMMUNICATIONS--INSULATING MATERIALS, MAGNETOMETERS, FIELD DETECTORS

W.B. FOWLER, Lehigh University, School of Arts, *Bethlehem, Pennsylvania* 18015 (N00014-67-A-0370-0004)

This research makes use of magnetic resonance techniques for determining the effects of impurities, temperature and heat treatment on various insulators, quartz, alkali halides and other materials used by the Navy as material components in the construction of integrated circuits, field effect transistors and in magnetometers for submarine detection and ocean surveillance, in its surveillance and communications operations and in its material support technology.

Electron paramagnetic resonance measurements are being made on the defect centers in quartz and the technique of defect photoconductivity is being used to study the electronic structure in thin films of silicon dioxide. Theoretical models will be constructed to determine the ionic disposition within these crystals and the electronic wave functions, energies and optical properties of the defects will be determined.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0041, MATERIAL SUPPORT TECHNOLOGY - RADIATION EFFECTS IN SILICON DIOXIDE MATERIALS

C. JONES, Lehigh University, School of Arts, *Bethlehem, Pennsylvania* 18015 (N00014-67-A-0370-0009)

Many electronic and optical components in Navy systems incorporate silicon dioxide, which is affected by radiation. Some miniaturized electronic components are particularly vulnerable to radiation effects in thin films of silicon dioxide, and these effects are directly related to various defects and impurities in the oxide. This task will study the properties of radiation produced defects in silicon dioxide and attempt to relate them to the important electrical properties.

Some of the radiation induced problems associated with the technological uses of silicon dioxide are dependent on the impurities and defects in the material. Some of the important impurities, aluminum, hydrogen and alkali ions, are assumed to form complexes which bring about the problem of charge trapping under irradiation. It is the purpose of this task to try to identify specific types of defects or complexes in crystalline quartz and relate them to the electrical and optical properties. The attempt will then be made to extrapolate these results to amorphous silicon dioxide, based on the assumption, that the amorphous material is made up of small crystalline structures. simultaneous, correlated epr and optical absorption measurements will be made to provide more definitive identifications of complex defects produced during irradiation and removed during annealing. The germanium, aluminum-alkali, and oxygen vacancy centers will be investigated.

Supporting agency address information: Office of Naval Research 422, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0042, ENERGY CONVERSION - NONEQUILIBRIUM SHOCK TUNNEL MAGNETOHYDRODYNAMIC (MHD) POWER GENERATION

B. ZAUDERER, General Electric Company, *Philadelphia, Pennsylvania* 19123 (N00014-73-C-0039)

The objective of this research is to experimentally examine the interaction of ionized gases in magnetic fields in order to determine the capability of magnetohydrodynamic power generation to meet the Navy's future power needs.

A shock tunnel MHD facility is being used as the experimental tool to evaluate the capability of generating high density power by the technique of increasing the electron temperature several times that of the basic working fluid, thereby obtaining a gas electrical conductivity sufficient to make the nonequilibrium ionization technique attractive. Modifying the shock tunnel, by increasing the magnetic field capability, improving the preionization discharge, varying the electrode configuration, and controlling the temperature of the driving gas are experimental variables to be examined. The results will be compared with theoretical generator analysis.

Supporting agency address information: Office of Naval Research 473, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0043, COMMUNICATIONS - MAGNETIC DETECTORS, AMPLIFIERS AND MAGNETIC ALLOYS

S.A. FRIEDBERG, Carnegie Mellon University, School of Engineering, *Pittsburgh, Pennsylvania* 15213 (N00014-67-A-0314-0006)

This work is concerned with determining the susceptibility and specific heats of magnetic compounds and alloys used by the navy in magnetic amplifiers, sensitive magnetic field detectors and antisubmarine magnetometer detectors, in its surveillance and communications operations.

Magnetic susceptibility and specific heats of antiferromagnetic compounds are studied as well as the magnetoresistance of Cu-Ni alloys, the heat transport in ferrimagnetic crystals and the optical spectra of magnetic crystals at helium temperatures.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0044, SURVEILLANCE - NONLINEAR ACOUSTIC GENERATION AND REFLECTION IN LIQUIDS AND SOLIDS

M.A. BREAZEALE, Univ. of Tennessee, School of Liberal Arts, *Knoxville, Tennessee* 37916 (N00014-71-A-0121-0001)

The objective is to determine how acoustic energy is redistributed at liquid-solid interfaces, and to use this information as an aid in determining how a submarine absorbs and reradiates active signals. second objective is to study and utilize nonlinear phenomena.

An apodized transducer which produces a beam of acoustic radiation with a gaussian amplitude distribution, is used to get ex-

perimental data. The data compares well with results predicted by solving the complex integral which describes the reradiated amplitude distribution. A theoretical description of parametric radiation in a resonant cavity is being formulated.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0045, MATERIALS SUPPORT TECHNOLOGY - LOW-TEMPERATURE PROPERTIES OF MATERIALS FOR SOLID STATE ELECTRONIC DEVICES
P. GIBBS, Univ. of Utah, School of Letters, *Salt Lake City, Utah* 84112 (N00014-71-C-0413)

Low-temperature behavior of solids measured on this project will provide materials support technology with the necessary information on the suitability of solid state materials for new electronic devices used in Navy communications and surveillance.

Measurements at low temperatures are undertaken with resonance techniques to show slow diffusion of atoms and to evaluate radiation damage effects in semiconductors; changes in optical properties due to defects are correlated with applied electric and strain fields; the dominant quantum effects in solid helium and the sensitivity of thermal properties of materials exhibiting phase changes (like SrTi03 and DY) are studied; experiments on weak magnetic interactions and critical phenomena are carried out in the millidegree range; and magnetic cooling is used in order to look at plasma effects in solids and low-frequency losses in soft superconductors.

Supporting agency address information: Office of Naval Research 421, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

8.0046, MONOLAYER PHYSICS
J.G. DASH, Univ. of Washington, School of Arts, *Seattle, Washington* 98105

Research supported by NSF Grant GH-33167 will be continued. The progress will deal with the properties of monolayer and multilayer films physically adsorbed on solid surfaces, and with the properties of the substrate themselves. The research is primarily experimental but also includes theoretical studies stimulated by recent measurements. New work will be concerned with the specific heat of H2 monolayers, a study of the thermodynamic relations for the 2-D phase of He4 on Grafoil and an investiation of new substrates.

SUPPORTED BY U.S. Natl. Science Foundation

8.0047, ELEMENTARY PARTICLE PHYSICS USING HIGH ENERGY ACCELERATORS
R.W. WILLIAMS, Univ. of Washington, School of Arts, *Seattle, Washington* 98105

A program of the study of strong interactions at very high energy will be carried out at the Fermi National Accelerator Laboratory. The two main parts of the program include: 1. A detailed study of the production of particle states with high transverse momenta. Single particle inclusive cross sections for pion p collisions will be measured. Searches for particle jet structure and studies of the energy and angular distribution in the recoil structure will be made. The information will be important in testing the parton model of the nucleon. 2. The phenomenon of diffraction dissociation will be studied by observing the reaction negative pion-He yields n negative pion plus (n-1) positive pions plus He; at 70 and 150 GeV/c in helium filled streamer chamber. The study will help to elucidate the situation with regard to the surface states to the pi meson.

This work is a continuation of that currently supported by Foundation grant number GP-23573, amendment number 4.

SUPPORTED BY U.S. Natl. Science Foundation

8.0048, NAVY ENVIRONMENT - SHOWER IONIZATION SFERICS
D.R. TOMPKINS, Univ. of Wyoming, School of Arts, *Laramie, Wyoming* 82070 (N00014-70-A-0266-0007)

The objective of this research is to map the noise background of clouds and thunderstorms and cold fronts, particularly the part of the background due to shower ionization. The value of the research for the Navy derives from its possible use in the diagnosis of severe weather situations, and also as basic environmental data for design of communication equipment.

On a shower ionization network largely equipped by NASA, special antennas have been installed to observe radio emissions from both air mass thunderstorms and those associated with cold fronts. Data on these emissions along with the shower geometry, size, and orientation, will be used to separate the part of the emission due to lightning sferics from that due to shower ionization.

Supporting agency address information: Office of Naval Research 412, Arlington, Va. 22217.

SUPPORTED BY U.S. Dept. of Defense - Navy

SOCIAL SCIENCES

Includes Social Sciences (general); Administration and Management; Documentation and Information Science; Economics and Cost Analysis; Law and Political Science; and Urban Technology and Transportation.

9.0001, APPLICATION OF MATHEMATICS AND STATISTICS TO ECONOMICS
G. DEBREU, Univ. of California, School of Letters, *Berkeley, California* 94720

The main collective activities of the Group for Applications of Mathematics and Statistics to Economics are centered on its computing facilities, its Econometrics Workshop and its research seminars. A modest augmentation of the Group's programming, computing and technical services is planned which should contribute significantly to the research of the members. The effectiveness of quantitative studies of other Economics faculty, likewise, should be enhanced by the strengthening of these joint facilities.

SUPPORTED BY U.S. Natl. Science Foundation

9.0002, THEORY AND APPLICATION OF MEASUREMENT IN PERSONNEL RESEARCH
E.I. JONES, U.S. Navy, Personnel Res. & Dev. Center, *San Diego, California* 92152

Fleet readiness and military preparedness would be critically deficient without properly qualified personnel. Systems of personnel management (selection, classification, assignment, recruitment, etc.) depend directly on appropriate measurement procedures for their effectiveness. The purposes of this research are to develop and test both the theoretical base and the pragmatic application of mathematical concepts related to personnel measurement techniques and instruments.

Three main approaches in this research are (a) the critical evaluation of statistical techniques currently used in personnel research; (b) the development and evaluation of analytic techniques and variable selection techniques for optimizing and maximizing decision effectiveness in problems involving categorical variables; and (c) development of methods to yield improved prediction of multiple, job relevant criterion variables.

Supporting agency address information: Navy Personnel R&D Center, San Diego, Calif. 92152.

SUPPORTED BY U.S. Dept. of Defense - Navy

9.0003, ADVANCED TECHNOLOGIES FOR CONTROLLER TRAINING
I. GOLDSTEIN, U.S. Navy, Training Equipment Center, *Orlando, Florida* 32813

Develop techniques for improving quality control while reducing costs of training Navy personnel to perform control activity such as ground controlled approach (GCA), other surface-based controller tasks and certain mission control functions of naval flight officers. These jobs have in common the use of restricted, stylized, speech to guide a man-machine system. This project will examine the training value of systems which incorporate advanced technologies such as: (a) machine understanding of spoken commands, (b) automated adaptive instruction, (c) advanced computer programming structures, (d) advanced training requirements analysis.

Develop enough of a system to demonstrate the feasibility of the concept in the case of a single GCA controller student guiding a single aircraft. Maximum use will be made of existing facilities at NAVTRAEQUIPCEN, i.e., TRADEC and ADCONS equipment and their respective program inventories. Later stages will consider development of multi- student, multi-aircraft versions and extending the concept to other controller-type training situations. At an appropriate point there will be an implementation for validation studies in an operational training setting.

Supporting agency address information: Naval Air Systems Command 340F, Washington, D.C. 20361.

SUPPORTED BY U.S. Dept. of Defense - Navy

9.0004, NATURAL LANGUAGE COMMUNICATION IN A PERSONAL INFORMATION RETRIEVAL SYSTEM
W.R. REITMAN, Univ. of Michigan, Mental Health Research Inst., *Ann Arbor, Michigan* 48104

This work is concerned with the mechanisms of human intelligence and natural language communication, and with the design of interactive computer programs that incorporate and utilize analogous mechanisms to improve man- machine communication. Information retrieval and game playing systems are used as vehicles for the analysis of semantic functions. Procedural representations for recognizing and utilizing local and global patterns and their properties and a perceptual, goal oriented framework for manipulating these representations have been developed and are being studied.

SUPPORTED BY U.S. Natl. Science Foundation

9.0005, PERSONNEL TECHNOLOGY--LIMITATIONS OF MENTAL PROCESSING SPEED OF TACTICAL INFORMATION-HANDLING PERSONNEL
J.L. ANDREASSI, City University of New York, Graduate School, *New York, New York* 10010 (N00014-72-A-0406-0006)

The aim of this research is an improved conceptualization of human processing of complex visual information. Navy personnel who must operate and process information from tactical data systems exhibit efficiency changes over time. The psychophysiological correlates of visual data processing should have important implications for understanding factors of vigilance, processing accuracy, as well as in learning and training situations.

This work will continue to study visual and auditory evoked responses (VER:AER) and the relationships among the evoking stimuli and the manner of presentation of the stimuli. Areas of research will include the effect of induced muscle tension on VER and on visual perception; relationship between simultaneous visual and auditory stimulation, VER, AER, and reaction time; and the relationship between latency of evoked responses and stimulus location in the visual field.

Supporting agency address information: Office of Naval Research 441, Washington, D.C. 20360.

SUPPORTED BY U.S. Dept. of Defense - Navy

9.0006, EXTENSION AND IMPLICATIONS OF MEAN SQUARED ERROR TEST FOR PARAMETER RESTRICTIONS IN ECONOMETRIC MODE
T.D. WALLACE, Univ. of North Carolina, Agricultural Experiment Sta., *Raleigh, North Carolina* 27600 (NC03343)

Objective: Develop weak mean squared error tests of restrictions in regression less demanding than F test or previous tests developed by project leader; characterize properties of sequential estimators based on alternative tests; tabulate statistic and provide intuitive bases for researchers' choices of the alternative criteria.

Approach: Theoretical and empirical pretesting by strong and weak MSE tests properties of sequential estimators; distribution of sequential estimators involving integrals intractable to analytical methods entailing use of IBM 360/75 computer; search of modern applied work in economics to provide cases where the new testing procedures can be contrasted with central F tests.

Progress: A mansucript was prepared entitled 'A Note on Extraneous Information in Regression' by R. Brook and T. D. Wallace and that will appear in Journal of Econometrics. Two additional papers were revised and published in Econometrica and a fourth paper is under revision by R. Brook for publication in Journal of the American Statistical Association. All of these papers contribute to the understanding and practice of combining prior information with sample data in the linear regression model, adding new hypothesis testing procedures and tables of critical points for carrying out the tests. The Brook paper contributes to the understanding of the probability characteristics of estimators based on prior testing and suggests a criterion for choosing significance levels. The work reported here is being extended to multivariate regressions and to simultaneous stochastic equation systems, the main difference being that in these latter systems we will be working with asymptotic distribution theory.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, WHITE DWARF STARS
P.A. STRITTMATTER, Univ. of Arizona, School of Liberal Arts, *Tucson, Arizona* 85721

Investigations will be continued both from the observational and theoretical points of view. Special emphasis will be placed on the problem of cooler white dwarfs, particularly their evolutionary status and the question of cooling times. The program includes a specific search for such objects. For hot white dwarfs, observations will address the questions of element abundances, gravitational settling, etc. On the theoretical side, studies will be made of the atmospheres of cooler white dwarfs, of the formation of DB white dwarfs and of x-ray sources as they relate to white dwarfs.

This is a continuation of work previously supported by GP-37926.

SUPPORTED BY U.S. Natl. Science Foundation

10.0002, STRUCTURE OF STELLAR SYSTEMS
I.R. KING, Univ. of California, School of Letters, *Berkeley, California* 94720

The dynamics of isolated nearly spherical systems of stars will be investigated under a variety of initial conditions. The initial conditions to be employed are the effects of systemic rotation, changes in mass-luminosity ratios, and variations in the velocity dispersions of the member stars. Automatic measurements of the photographic images of stars and galaxies will be done on the Berkeley PDS microdensitometer. The results may be of considerable cosmological significance.

This action provides additional funding and extends the duration of grant number GP 40483X for twelve months.

SUPPORTED BY U.S. Natl. Science Foundation

10.0003, RADIO ASTRONOMICAL STUDIES
W.J. WELCH, Univ. of California, Radio Astronomy Laboratory, *Berkeley, California* 94720

The research programs of the staff of the Radio Astronomy Laboratory will be supported, including the operation of the Hat Creek Observatory. The 85-foot telescope is completely automated and will be used for observations of neutral hydrogen, formaldehyde, and OH, particularly in regions which show evidence of active star formation. Very Long Baseline Interferometry will continue to be pursued, both in spectral lines and the continuum.

The millimeter-wave interferometer - composed of two movable 20- foot antennas - will be put into operation and equipped with K-band masers. Interferometric observations will be made of interstellar clouds, planets, and extragalactic compact sources.

This action provides additional funding and extends the duration of the grant number GP 41898X for 12 months.

SUPPORTED BY U.S. Natl. Science Foundation

10.0004, THEORETICAL STUDIES IN GRAVITATION AND ASTROPHYSICS
R.V. WAGONER, Stanford University, Graduate School, *Palo Alto, California* 94305

Research in relativistic astrophysics theory initiated under NSF Grant GP-39178 will continue. Topics to be investigated include: 1. Tests of gravitational theories (Wagoner, Will); 2. Gravitational radiation (Wagoner); 3. Compact astrophysical objects (Wagoner, Will); 4. Non-metric theories of gravity (Will); 5. Black Holes (Will).

SUPPORTED BY U.S. Natl. Science Foundation

10.0005, ASTRONOMY RESEARCH AT THE OWENS VALLEY RADIO OBSERVATORY
G.J. STANLEY, Calif. Inst. of Technology, Graduate School, *Pasadena, California* 91109

The research programs at the Owens Valley Radio Observatory include a continuation of the extragalactic HI synthesis and its extension to early type spirals. There are a number of programs involving synthesis of molecular distribution for OH and H O, as well as investigations of galactic sources with peculiar gas motions. Other projects are proposed to study recombination line emission in order to more accurately determine electron densities and temperatures in the interstellar medium. More accurate measurements of planetary brightness distributions and temperatures using newly acquired low noise amplifiers will be made.

VLBI observations will continue to be made, and the activity will be expanded to include Hat Creek and Goldstone for intermediate resolutions. Conversion of the 90-foot antennas to alt-azimuth will be completed. A VLBI processor and a wide band correlator are under construction.

This is a continuation of work previously supported by NSF Grant GP-30400X1.

SUPPORTED BY U.S. Natl. Science Foundation

10.0006, THEORETICAL AND OBSERVATIONAL STUDIES IN STELLAR AND GALACTIC ASTROPHYSICS
E.M. BURBIDGE, Univ. of California, Graduate School, *San Diego, California* 92038

Theoretical and observational research on several topics in stellar and galactic astrophysics will be completed. The main topics will be on theoretical studies of the physics of nonthermal sources, circumstellar and interstellar grains, the nuclei of galaxies, and X-ray and gamma ray sources. The observational program will include photometry from ultraviolet to infrared wavelengths, measurements of variability of cool stars at visible and infrared wavelengths, spectrophotometry from 2 to 20 microns of objects identified in the Air Force Cambridge Research Laboratory survey, and photometric studies of the energy distribution of infrared sources from optical wavelengths to submillimeter wavelengths. The instrumental development will include optical improvements, UBVRI photometric system, a dispersing infrared spectrometer, and a new Perkin Elmer spectrograph following installation of the new Cervit mirror for the Mt. Lemmon 60-inch telescope.

This is a continuation of work previously supported by NSF grant GP- 30643X2.

SUPPORTED BY U.S. Natl. Science Foundation

10.0007, EXTERNAL GALAXIES AND QUASI-STELLAR OBJECTS
E.M. BURBIDGE, Univ. of California, School of Engineering, *San Diego, California* 92038

The research will be directed to attacking current problems relating to the physical properties, evolution, and origin of the various components of the extragalactic universe. A combination of theory and observations using the best equipment available will give the best approach to the solution of the problems. The research will be in the following areas: (1) Observational and theoretical studies of quasi- stellar objects, both radio sources and radio-quiet objects.(2) Further study, both observational and theoretical, of the BL Lacertae class of radio sources. (3) Study of extragalactic objects in the Southern Hemisphere (class of objects and faint limit will be dictated by the instrumentation available). (4) Observational and theoretical studies of radio galaxies (both nuclei and outer parts) and the nuclei of active galaxies. (5) Studies of certain specific groups of galaxies where observations and accepted theory lead to conflicting results.

This is a continuation of work previously supported by NSF GP-20280 03.

SUPPORTED BY U.S. Natl. Science Foundation

10.0008, THEORETICAL INVESTIGATIONS IN STELLAR DYNAMICS AND GALACTIC STRUCTURE
P.O. VANDERVOORT, Univ. of Chicago, Graduate School, *Chicago, Illinois* 60637

A development of a general epicyclic theory of the orbits of stars near the Lindblad resonances has been completed. The results make possible the systematic investigation of unsolved problems concerning the role of the Lindbald resonances in the dynamics of spiral structure. Investigations will be done concerning the self-consistant structure of a density wave in the resonance regions, hydrodynamic flows in the resonance regions, the resonant behavior of stellar orbits under other non-axisymmetric perturbations such as weak bars or mass concentrations in circular orbits, the resonant behavior of stellar orbits under slow changes in the prevailing gravitational field. The investigation will make it possible to understand the mechanisms for the generation, absorption and/or reflection of density waves in the resonance regions.

This is a continuation of work previously supported by NSF grant GP-17639.

SUPPORTED BY U.S. Natl. Science Foundation

10.0009, SPECTRA OF PLANETARY NEBULAE
J.B. KALER, Univ. of Illinois, School of Liberal Arts, *Urbana, Illinois* 61801

A series of interrelated programs will be supported to study the conditions and composition of many planetary nebulae. Techniques to be applied at the 40-inch Prairie Observatory reflector are spectrographic, photoelectric, and direct photography. The two goals of the program are: (1) to obtain temperatures, densities, masses, extinctions, chemical abundance ratios, central star temperatures, and distances, and (2) to use these data for stars in their late evolutionary stages to examine aspects of chemical evolution in stars and in the galaxy. A catalogue of the intensities and identifications of emission lines from both planetary and diffuse nebulae will be published.

This is a continuation of work previously supported by NSF grant GP 22957-1.

SUPPORTED BY U.S. Natl. Science Foundation

10.0010, A HIGH SENSITIVITY SURVEY TO DETECT NEW PULSARS
J.H. TAYLOR, Univ. of Massachusetts, School of Arts, *Amherst, Massachusetts* 01002

A high sensitivity survey for new pulsars will be continued using a sophisticated signal processing technique. In a ten-day trial at the National Astronomy and Ionosphere Center, seven new pulsars have already been discovered, and at least fifty new pulsars are estimated to be discovered. The addition of more core memory and a better teleprinter/keyboard is planned to improve the speed and sensitivity of the recording and analysis computer. The three goals are: (1) an increase of the number of pulsars to help in classification discussions; (2) a search for pulsars of particular uniqueness, such as short period ones that are young; and (3) delineating the space distribution of the pulsars by measuring distances from the signal dispersion due to interstellar electrons.

This is a continuation of work previously supported by NSF grant GP 37917.

SUPPORTED BY U.S. Natl. Science Foundation

10.0011, THEORETICAL ASTROPHYSICS AND COSMOLOGY
P. MORRISON, Mass. Inst. of Technology, School of Science, *Cambridge, Massachusetts* 02139

Research on a number of topics in theoretical astrophysics and cosmology will be carried out. The main areas of study include (1) fluorescence theory of type I supernovae, both implications and observational tests, in particular, by detailed studies of the recent supernova in NGC5253; (2) Spinars, their connection to double radio sources and to the origins of cosmic ray protons; (3) models of discrete galactic X- and gamma ray sources, including the pulsating (periodic and non-periodic) sources Gen X-3, Her X-1, and Cyg X-1, and recurrent and impulsive gamma ray sources; (4) neutron star properties including mass upper limit, pulsar emission mechanisms, cosmic ray acceleration, with emphasis on observable connections to the Crab occultations to be measured by the MIT satellite and balloon X-ray programs next year; (5) extended extra-galactic X-ray and related radio sources, in particular, properties of the exploding galaxy M82 and properties of the intracluster medium in rich galaxy clusters; (6) tests of big bang cosmologies using evolutionary source models to discuss the radio and X- ray background, log N-log S, and O-z tests.

This is a continuation of work previously supported under grant GP- 30860X.

SUPPORTED BY U.S. Natl. Science Foundation

10.0012, RADIO ASTRONOMY INVESTIGATIONS OF MOLECULAR LINE EMMISSION - AND INTERFEROMETRIC INVESTIGATIONS OF GEOPHYSICAL PHENOMENA
M.L. MEEKS, Northeast Radio Observ. Corp., *Cambridge, Massachusetts* 01886

The project is a continuation of work initiated under GF-38720 for cooperation in the title subjects between the U.S. and Brazilian Institutions. NEROC will complete and help install at Itapetinga a K- band helium-cooled maser amplifier similar to the prototype now operating at Haystack. The Brazilian institution will provide the components needed there for a VLBL receiver and for spectral-line radiometry in the 20-25 GHz. range. The VLBL is approximately 7300 km., 25 degrees off the north-south line. Water and ammonia spectral line emissions will be studied and searches conducted for other fine-scale angular structures. It is hoped to link the VLBL work with an observatory in the western United States and eventually with the new Swedish radio telescope under construction.

SUPPORTED BY U.S. Natl. Science Foundation

10.0013, THEORETICAL HIGH ENERGY ASTROPHYSICS
J.P. OSTRIKER, Princeton University, Graduate School, *Princeton, New Jersey* 08540

Theoretical research will be done on the last brief stages of stellar evolution before stars become white dwarfs, neutron stars, or black holes, on the rotation of these condensed stars, and on the dynamics of stars in star clusters and galaxies. Models of binary x-ray sources will be tested by observational data. Far pulsars, magnetic field decay, and the rotation spin down will be studied and the predicted output matched with electromagnetic spectrum observations. Mass loss by radiation pressure on solid grains around red supergiants will be considered. Further studies will be done on pulsars to see if they could result in supernovae. The fission of rotating stars will be investigated. The evolution of many body systems will be further developed. Concurrently, the stellar and elemental abundances of galaxies will be considered. Finally, quasi-stellar object models will be constructed. This is a continuation of work previously supported by NSF grant GP 34888X1.

SUPPORTED BY U.S. Natl. Science Foundation

10.0014, GRAVITATION, RELATIVITY AND COSMOLOGY
D.T. WILKINSON, Princeton University, Graduate School, *Princeton, New Jersey* 08540

Research supported by grant GP-30799X1 will continue. Topics include: 1. Solar oblateness studies; 2. Statistical analysis of catalogs of extragalactic objects; 3. Stability of small groups of galaxies; 4. Detection of young galaxies; 5. Polarization of 3 k microwave background; 6. Microwave anisotropy measurements; 7. Surface brightness of distant galaxies; 8. Measurements on Population II binary stars; 9. Radion pulsars near the galactic center; 10. The crisis of gravitational collapse; 11. Collapse of rotating white dwarfs; 12. Effect of space curvature on vacuum polarization; 13. Implications of Mach's principle; 14. Initial value problem; 15. Black holes and neutron stars in binary x-ray sources.

SUPPORTED BY U.S. Natl. Science Foundation

10.0015, PULSATIONAL AND SECULAR STABILITY, MAGNETIC FIELD DECAY, AND DIFFERENTIAL ROTATION IN DEGENERATE STARS
H.M. VANHORN, Univ. of Rochester, School of Arts, *Rochester, New York* 14627

Radial and non-radial pulsational stability will be investigated theoretically for models of white dwarfs which include ionization, Coulomb and crystallization effects in the material properties and the effects of magnetic fields and rotation. The stability calculations will be extended to degenerate stars undergoing mass accretion and nuclear burning. The evolution of white dwarfs from previous stages will be studied especially in the case with large magnetic fields. The question of the existence of stable differentially rotating objects with central densities between white dwarfs and neutron stars will be addressed also. These calculations will allow opportunities for mass determinations of white dwarfs from their stability and their pulsation periods.

This is a continuation of work previously supported by NSF GP- 36098.

SUPPORTED BY U.S. Natl. Science Foundation

10.0016, LOW DISPERSION ASTRONOMICAL SPECTROSCOPY AND GALACTIC STRUCTURE
S.W. MCCUSKEY, Case Western Reserve Univ., School of Arts, *Cleveland, Ohio* 44106

The investigations of the spectral classifications for many thousand stars, have resulted in the detection of faint high-luminosity stars along the Milky Way, have introduced near-infrared spectral classification techniques for M giants and other highly luminous cool objects, and have yielded considerable detailed knowledge concerning the stellar luminosity function and the spatial arrangement of the stars around the sun. All of these studies bear on the structure of our galaxy and in particular on its spiral nature. An extension of this research to the southern Milky Way is an important part of these studies.

A continuation of research now under way, and also new projects which are developing from current work will be carried out. These problems require the use of the Burrell Schmidt telescope and the 36- inch reflector of Warner & Swasey Observatory, as well as the instrumentation available at the Kitt Peak National Observatory and the Cerro Tololo Inter-American Observatory in Chile. An arrangement of cooperative work with the Bosscha Observatory in Lembang, Indonesia, provides Schmidt telescope data from there. Some of the programs involve work in intermediate and narrow-band photometry. All are aimed at a more detailed knowledge of the local galactic structure and many have relevance to various aspects of the theory of stellar evolution.

This action provides additional funding and extends the duration of the grant number GP-39967X for 12 months.

SUPPORTED BY U.S. Natl. Science Foundation

10.0017, PREPARATION AND PUBLICATION OF AN ATLAS OF SPECTRA OF COOL STARS
P.C. KEENAN, Ohio State University, School of Arts, *Columbus, Ohio* 43212

An atlas of slit spectrograms taken at the Perkins, Lowell, Palomar, and Cerro Tololo Observatories will be compiled for stars of spectral types later than GO. The spectra will include some peculiar type stars for which classification is difficult. Dispersions used will be the standard 80 angstroms per millimeter as well as those as high as 13 angstroms per millimeter taken with Coude focus spectrographs to show composition and line width effects. The atlas is intended to be a general revision of the 1942 Morgan-Keenan atlas for the cooler stars.

This is a continuation of work priviously supported by NSF grant GPa30949.

SUPPORTED BY U.S. Natl. Science Foundation

10.0018, THEORETICAL INVESTIGATION OF THE STELLAR AND GASEOUS CONTENTS OF GALAXIES AND THEIR EVOLUTION

B.M. TINSLEY, Univ. of Texas, Graduate School, *Dallas, Texas* 75230

Numerical and analytical studies of chemical and stellar evolution in the solar neighborhood of this Galaxy have provided further understanding of the origin and abundances of certain elements, and of general constraints that must be met by consistent models for evolution of the Galaxy. Progress has also been made in understanding the stellar populations in giant elliptical galaxies, and their evolution, and a variety of related problems such as the effects of metal abundances on galactic colors and the density of the universe have been studied. There will be continued research on these and other related topics. Chemical and stellar evolution studies will include work on CNO isotopes, red giant populations in the Galaxy, and supernova rates. New results on the evolution of elliptical galaxies will be applied to cosmology, and cosmological studies of the number-magnitude relation, the search for young galaxies, and the cosmic light will be made.

This is a continuation of work previously supported by NSF grant GP-40482.

SUPPORTED BY U.S. Natl. Science Foundation

VOLUME 13 NUMBER 1 / JANUARY 8, 1975

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

No abstracts in this category.

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

N75-10001* + National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A SPECIAL BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 47
Aug. 1974 66 p refs
(NASA-SP-7037(47)) Avail: NTIS HC $4.00 CSCL 01A

This special bibliography lists 185 reports, articles, and other documents introduced into the NASA scientific and technical information system in July 1974. Author

N75-10002* + National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A SPECIAL BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 48
Sep. 1974 92 p refs
(NASA-SP-7037(48)) Avail: NTIS HC $4.00 CSCL 01A

This special bibliography lists 291 reports, articles, and other documents introduced into the NASA scientific and technical information system in August 1974. Author

N75-10003# Advisory Group for Aerospace Research and Development, Paris (France).
HINGELESS ROTORCRAFT FLIGHT DYNAMICS
Kurt H. Hohenemser (Washington Univ., St. Louis) and Robert A. Ormiston, ed. (Army Air Mobility R and D Lab., Moffett Field, Calif.) Sep. 1974 50 p refs
(AGARD-AG-197; AGARDograph-197) Avail: NTIS HC $3.75

The state of hingeless rotorcraft research and development in the NATO countries as of 1973 is described. The scope of this report is limited to flight dynamics since most of the hingeless rotorcraft problems have occurred in this area. The special place of the hingeless rotorcraft within the family of rotorcraft is considered. The chapter on the history of hingeless rotorcraft describes the hingeless rotor research and development of the various rotorcraft manufacturers and the hingeless rotor research at government laboratories and universities. A hierarchy of dynamic concepts from isolated blade dynamics to complete rotor/body dynamics is introduced. The effects of the basic rotor design parameters on flight dynamics are traced and certain hingeless rotorcraft problems are treated in some detail. A special chapter is devoted to the alleviation of hingeless rotor flight-dynamics problems by feedback control systems. Analytical modeling techniques, mathematical analysis techniques, and model and flight testing techniques for hingeless rotorcraft are discussed. Author

N75-10004*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SOME FACTORS AFFECTING THE USE OF LIGHTER THAN AIR SYSTEMS
C. Dewey Havill Sep. 1974 43 p refs
(NASA-TM-X-62374) Avail: NTIS HC $3.75 CSCL 01C

The uses of lighter-than-air vehicles are examined in the present day transportation environment. Conventional dirigibles were found to indicate an undesirable economic risk due to their low speeds and to uncertainties concerning their operational use. Semi-buoyant hybrid vehicles are suggested as an alternative which does not have many of the inferior characteristics of conventional dirigibles. Economic and performance estimates for hybrid vehicles indicate that they are competitive with other transportation systems in many applications, and unique in their abcity to perform some highly desirable emergency missions. Author

N75-10005*# Lockheed-Georgia Co., Marietta.
GROUND EFFECT FOR V/STOL AIRCRAFT CONFIGURATIONS AND ITS SIMULATION IN THE WIND TUNNEL. PART 3: THE TANGENTIALLY BLOWN GROUND AS AN ALTERNATIVE TO A MOVING GROUND: APPLICATION TO THE NASA-AMES 40 BY 80-FOOT WIND TUNNEL
J. E. Hackett, E. B. Praytor, and E. O. Caldwell [1973] 59 p refs
(Contract NAS2-6690)
(NASA-CR-114497) Avail: NTIS HC $4.25 CSCL 01B

A set of conceptual drawings showing the application of slot-blowing boundary layer control to the 40- by 80-foot wind tunnel is presented. In small scale pilot experiments unswept slots were used, fed by a below-floor plenum. The model was sting mounted and its wing was unswept. However, design for the Ames tunnel was heavily constrained, both by under floor balance mechanisms and by a large turntable. An over floor supply system was therfore designed. A description of appropriate procedures for using the floor tangential blowing system is given. Though some of the operating graphs are specific to the design for the Ames tunnel, both non-dimensional plots and the approach generally are widely applicable. Author

N75-10006*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EXTRACTION FROM FLIGHT DATA OF LATERAL AERODYNAMIC COEFFICIENTS FOR F-8 AIRCRAFT WITH SUPERCRITICAL WING
James L. Williams and William T. Suit Washington Nov. 1974 37 p refs
(NASA-TN-D-7749; L-9619) Avail: NTIS HC $3.75 CSCL 01C

A parameter-extraction algorithm was used to determine the

lateral aerodynamic derivatives from flight data for the F-8 aircraft with supercritical wing. The flight data used were the recorded responses to aileron or rudder pulses for Mach numbers of 0.80, 0.90, and 0.98. Results of this study showed that a set of derivatives were determined which yielded a calculated aircraft response almost identical with the response measured in flight. Derivatives extracted from motion resulting from rudder inputs were somewhat different from those resulting from aileron inputs. It was found that the derivatives obtained from the rudder-input data were highly correlated in some instances. Those from the aileron input had very low correlations and appeared to be the more reliable. Author

N75-10007*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

WIND TUNNEL TESTS OF MODIFIED CROSS, HEMISFLO, AND DISK-GAP-BAND PARACHUTES WITH EMPHASIS IN THE TRANSONIC RANGE

Jerome T. Foughner, Jr. (Goodyear Aerospace Corp.) and William C. Alexander Washington Nov. 1974 38 p refs
(NASA-TN-D-7759; L-9421) Avail: NTIS HC $3.75 CSCL 01C

Transonic wind-tunnel studies were conducted with modified cross, hemisflo, and disk-gap-band parachute models in the wake of a cone-cylinder shape forebody. The basic cross design was modified with the addition of a circumferential constraining band at the lower edge of the canopy panels. The tests covered a Mach number range of 0.3 to 1.2 and a dynamic pressure range from 479 Newtons per square meter to 5746 Newtons per square meter. The parachute models were flexible textile-type structures and were tethered to a rigid forebody with a single flexible riser. Different size models of the modified cross and disk-gap-band canopies were tested to evaluate scale effects. Model reference diameters were 0.30, 0.61, and 1.07 meters (1.0, 2.0, and 3.5 ft) for the modified cross; and nominal diameters of 0.25 and 0.52 meter (0.83 and 1.7 ft) for the disk-gap-band; and 0.55 meter (1.8 ft) for the hemisflo. Reefing information is presented for the 0.61-meter-diameter cross and the 0.52-meter-diameter disk-gap-band. Results are presented in the form of the variation of steady-state average drag coefficient with Mach number. General stability characteristics of each parachute are discussed. Included are comments on canopy coning, spinning, and fluttering motions. Author

N75-10008*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

A PARAMETRIC STUDY OF EFFECT OF FOREBODY SHAPE ON FLOW ANGULARITY AT MACH 8

Charles B. Johnson and Don C. Marcum, Jr. Washington 20 Nov. 1974 48 p refs
(NASA-TN-D-7768; L-9639) Avail: NTIS HC $3.75 CSCL 20D

Flow angularity and static pressure measurements have been made on the lower surface of nine forebody models that simulate the bottom forward surface of a hypersonic aircraft. Measurements were made in an area of the forebody that represents the location of an inlet of a scramjet engine. A parametric variation of the forebody surface investigated the effect of: (1) spanwise curvature; (2) longitudinal curvature; and (3) planform shape on both flow angularity and static pressure distribution. Results of each of the three parametric variations of geometry were compared to those for the same flat delta forebody. Spanwise curvature results showed that a concave shape and the flat delta had the lowest flow angularity and lowest rate of increase in flow angularity with angle of attack. Longitudinal curvature results showed a convex surface to give the better flow at the higher angles of attack. The better of the two planform shapes tested was a convex elliptical shape. Limited flow field calculations were made at angles of attack using a three dimensional, method-of-characteristics program. In general, at all angles of attack there was agreement between data and theory. Author

N75-10009*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

AN EXPLORATORY FLIGHT INVESTIGATION OF HELICOPTER SLING-LOAD PLACEMENTS USING A CLOSED-CIRCUIT TELEVISION AS A PILOT AID

Daniel J. DiCarlo, Henry L. Kelley (US Army Air Mobility R and D Lab.), and Kenneth R. Yenni Washington 20 Nov. 1974 23 p refs
(NASA-TN-D-7776; L-9744) Avail: NTIS HC $3.25 CSCL 01B

Helicopter sling load operations have been limited during pick up and delivery of external cargo by the lack of precision achieved by the combination of pilot, helicopter, and sling load. Use of a closed circuit television as a pilot aid during sling load delivery and placement was documented along with additional cases representing procedures currently employed by military and commercial operators. Although an increase in pilot workload was noted when the television system was used, the results indicated a comparable level of performance for each test case. Author

N75-10010# Saab-Scania, Linkoping (Sweden).

APPLICATION OF THE POLAR COORDINATE METHOD TO OSCILLATING WING CONFIGURATIONS

Valter J. E. Stark [1974] 42 p refs
(SAAB-TN-69) Avail: NTIS HC $3.75

A previously published method for the calculation of aerodynamic forces on oscillating wings with partial-span control-surfaces in subsonic flow by using polar integration variables has been generalized and programmed in FORTRAN. The program can treat combinations of up to 10 trapezoidal surfaces with several control-surfaces and tabs. The input data for the deflection modes may consist of measured values. These are treated by a subprogram that fits a function with suitable edge characteristics to the data for each mode. Numerical results are given for several configurations. Comparisons for simple modes with results of other methods show close agreement in most cases. Author

N75-10011# European Space Research Organization, Paris (France).

AEROSPACE RESEARCH Bimonthly Bulletin No. 1973-4 Sep. 1974 129 p refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel No. 1973-4, ONERA, 1973
(ESRO-TT-90) Avail: NTIS HC $5.75; ONERA, Paris 20 F

Topics in aerodynamics and materials are presented. A large scale leading edge method was applied in a water tunnel to determine two dimensional flow distribution. Various methods of visualizing the flow in wind tunnels were applied to an airfoil having a high rate of curvature at the leading edge and a separation bubble at incidence. The modifications of a light element microanalyzer are discussed. The equipment to investigate the thermal decomposition of an ablative material is detailed. The lifting surface theory was applied to fixed wings and propellers. Spectral density curves in wind tunnel flutter measurements are analyzed. For individual titles, see N75-10012 through N75-10017.

N75-10012 European Space Research Organization, Paris (France).

ON THE FLOW AROUND THE LEADING EDGE OF AN AEROFOIL

Henri Werle *In its* Aerospace Res. (ESRO-TT-90) Sep. 1974 p 1-40 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel No. 1973-4, 1973, p 197-218 (For availability see N75-10011 01-02)

In a water tunnel, the large scale leading edge method was successfully applied to the physical study of two dimensional flows which had previously been the subject of visualization on complete models. The phenomena occurring at the leading edge of an airfoil are analyzed, together with their evolution as a function of the angle of attack and other parameters. Tests reveal the location of the stagnation point, the extent of the separation, and the effectiveness of the means used to reduce or avoid it: suction, blowing, leading edge slats, rotation, etc.
Author (ESRO)

N75-10013 European Space Research Organization, Paris (France).

METHODS OF VISUALIZING THE LEADING EDGE SEPARATION BUBBLE AND ANALYSIS OF THE RESULTS c34

Emile Erlich *In its* Aerospace Res. (ESRO-TT-90) Sep. 1974 p 41-53 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel No. 1973-4, 1973, p 219-223 (For availability see N75-10011 01-02)

Various methods of visualizing the flow in wind tunnels were used on an airfoil having a high rate of curvature at the leading edge (peaky) and which at incidence presented a separation bubble (short bubble). Visualization by means of sublimate or viscous coatings, and by a colored reagent, complemented each other to define the positions of the separation point, transition point within the bubble, and reattachment point. Visualization tests in a water tunnel also served to complement this data.
Author (ESRO)

N75-10014 European Space Research Organization, Paris (France).
RECENT IMPROVEMENTS IN THE LIGHT ELEMENT MICROANALYSER **c14**
Francoise Pichoir *In its* Aerospace Res. (ESRO-TT-90) Sep. 1974 p 54-67 refs Transl. into ENGLISH from La Rech. Aerospatiale. Bull. Bimestriel No. 1973-4, 1973, p 225-231 (For availability see N75-10011 01-01)

Modifications were introduced into the light element microanalyzer: special filaments, composition of the counter windows and filter mounting, and amplification of the electron image. These improvements have made it possible to increase the sensitivity of the analysis and its spatial resolution. Some examples of the analysis of compounds containing boron, carbon and nitrogen reveal the improved performance.
Author (ESRO)

N75-10015 European Space Research Organization, Paris (France).
AN EXPERIMENTAL STUDY OF THE THERMAL DECOMPOSITION OF AN ABLATIVE MATERIAL **c35**
Jean Jamet et al *In its* Aerospace Res. (ESRO-TT-90) Sep. 1974 p 68-94 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel No. 1973-4, 1973, p 233-244 (For availability see N75-10011 01-02)

Two pieces of equipment used for the measurement of thermal diffusivity between 20 C and 1000 C by the flash laser method, and the kinetics of the formation of gaseous products by means of mass spectrometry during pyrolysis are described. These measurements have made it possible to define the thermophysical changes in the material, the nature of the thermal decomposition reactions and the compounds produced, together with the rates of formation of these compounds. Author (ESRO)

N75-10016 European Space Research Organization, Paris (France).
LIFTING SURFACE THEORY APPLIED TO FIXED WINGS ANP PROPELLERS
Rolland Dat *In its* Aerospace Res. (ESRO-TT-90) Sep. 1974 p 95-116 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel No. 1973-4, 1973, p 245-254 (For availability see N75-10011 01-02)

An integral equation is formulated which defines the velocity potential induced by a lifting surface in arbitrary motion within a fluid. This equation can be applied to fixed wings, propellers, or rotary wings, and permits the treatment of problems or aeroelasticity of these structures using methods that are known to be effective for the prediction of aircraft flutter.
Author (ESRO)

N75-10017 European Space Research Organization, Paris (France).
ANALYSIS OF SPECTRAL DENSITY CURVES IN WIND TUNNEL FLUTTER MEASUREMENTS
Roger Destuynder et al *In its* Aerospace Res. (ESRO-TT-90) Sep. 1974 p 117-124 ref Transl. into ENGLISH from La Rech. Aerospatiæd, Bull. Bimestriel No. 1973-4, 1973, p 255-257 (For availability see N75-10011 01.02)

The response of an aeroelastic model is reviewed when subjected to an excitation caused by the natural turbulence of the wind tunnel. A method of smoothing is proposed which at the same time permits the optimization of the results with respect to a certain number of parameters. An application of the method is given for the response of a known system to a random excitation. A second example deals with an actual wind tunnel case. Author (ESRO)

N75-10018# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Porz (West Germany)j Inst. fuer Angewandte Gasdynamik.
DETERMINATION OF AERODYNAMIC DERIVATIVES USING THE DISCRETE FOURIER TRANSFORMATION OF TRANSIENT OSCILLATIONS Ph.D. Thesis - Tech. Hochschule Aachen [DIE ERMITTLUNG AERODYNAMISCHER DERIVATIVA MIT HILFE DER DISKRETEN FOURIER-TRANSFORMATION FREIER SCHWINGUNGEN]
Norman Treinies 7 Feb. 1974 133 p refs In GERMAN; ENGLISH summary
(DLR-FB-74-17) Avail: NTIS HC $5.75; DFVLR, Porz, West Ger. 47,80 DM

A procedure for the automatic determination of aerodynamic derivatives is described using transient oscillations of dynamic wind tunnel balances with one or more degrees of freedom. The data reduction is carried out by application of the discrete Fourier transformation DFT, the properties of which are being extensively discussed. An ALGOL-computer programm is described basing on the Cooley-Tukey algorithm for the DFT. As a first application, measurements of the ERNO LB 21 lifting body were obtained. The derivatives were derived as a function of angle of attack at Mach numbers 0.5; 0.7; 2.5; 3.5 and 4.5.
Author (ESRO)

N75-10019# Aeronautical Resdarch Inst. of Sweden, Stockholm.
MEASUREMENTS OF DYNAMIC STABILITY DERIVATIVES OF AN OGIVE DELTA WING MODEL AT TRANSONIC AND SUPERSONIC SPEEDS Final Report
Goeran Ehn and Tommy Landen Feb. 1974 64 p refs (Contract INK-07-12615)
(FFA-TN-AU-925) Avail: NTIS HC $4.25

An ogive delta wing model with 64.4 deg leading edge sweep back and the test equipment used to measure dynamic stability derivaties are described. Tests were performed in the FFA wind tunnel S4 in the Mach number range 0.8 - 1.92. Damping in pitch and yaw derivatives were obtained utilizing a free-flexure sting. Roll damping derivatives and side force and yawing moment derivaties were measured using a rotating sting. The results were compared with RAE estimates. The damping in pitch, roll, and yaw-roll cross derivatives agree with the estimated values, whereas the damping in yaw derivatives deviate from estimated values. The elevator angle has some effect on the roll derivatives and the cross derivative. Author (ESRO)

N75-10020# Aeronautical Research Inst. of Sweden, Stockholm.
EVALUATION OF THE ACCURACY OF TWO HELICOPTER ROTOR THEORIES
B. C. A. Johansson May 1974 150 p refs Sponsored by Swed. Mater. Admin.
(FFA-124) Avail: NTIS HC $5.75; Almqvist & Wiksell Sw.Kr.40

The accuracy of two helicopter rotor or propeller theories is examined by comparison with experiments and with older theories. The accuracy of the first theory is found to be satisfactory. The second theory shows good agreement with other disk approximation theories. It is also found that the use of the disk approximation gives a too small induced downwash at the locations of the blades, in particular when the blades are few. Author (ESRO)

N75-10021# Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.
THE NATURE, DEVELOPMENT AND EFFECT OF THE VISCOUS FLOW AROUND AN AEROFOIL WITH HIGH-LIFT DEVICES
D. N. Foster, P. R. Ashill, and B. R. Williams London Aeron. Res. Council 1974 52 p refs Supersedes RAE-TR-72227; ARC-34436
(ARC-CP-1258; RAE-TR-72227; ARC-34436) Avail: NTIS HC $4.25; HMSO 80p; PHI $3.35

The nature of the viscous flow around an airfoil with high-lift devices is described. A method of calculating the development of the viscous layers is considered. The contributions of the wing wake and flap boundary layer to the lift carried by the components of the multiple airfoil were examined. The manner in which the viscous layers may be incorporated into a calculation of the loading on the airfoil is discussed. Author (ESRO)

N75-10022# Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.
THE DESIGN OF A SERIES OF WARPED SLENDER WINGS FOR SUBSONIC SPEEDS
Patricia J. Davies London Aeron. Res. Council 1974 87 p refs Supersedes RAE-TR-71173; ARC-33723
(ARC-CP-1263; RAE-TR-71173; ARC-33723) Avail: NTIS HC $4.75; HMSO £L1.35; PHI $5.30

The derivation of warped (cambered and twisted) mean surfaces is described for a series of wind tunnel models of low aspect ratio wings with pointed apexes, 'mild-gothic' planforms and sharp leading edges. The primary aim was to obtain higher ratios of lift to drag than those of the plane wing while maintaining the same orderly development of the flow. Subsidiary aims were to assess how far performance might be compromised by varying the center of pressure of the wing and by shaping it to reduce the lateral propagation of noise from an overwing engine installation. The mathematical basis is the linearized theory of subsonic flow. The shapes and pressure distributions of the models are shown. Author (ESRO)

N75-10023# Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.
A CALCULATION METHOD FOR THE TWO DIMENSIONAL TURBULENT FLOW OVER A SLOTTED FLAP
H. P. A. H. Irwin London Aeron. Res. Council 1974 54 p refs Supersedes RAE-TR-72124; ARC-34236
(ARC-CP-1267; RAE-TR-72124; ARC-34236) Avail: NTIS HC $4.25; HMSO 80p; PHI $3.35

An integral calculation method for the two dimensional turbulent flow over a slotted flap is described, which takes into account the interaction of the wake from the main airfoil with the boundary layer on the flap, and the variation of static pressure normal to the flap surface. The results were compared with experiment, and it was found that the method gives good agreement with the measured variation of the integral properties of the wake and boundary layer, and with the measured skin friction. The limitations of the method are discussed briefly in relation to the more complex approach of a differential method. Author (ESRO)

N75-10024# Royal Aircraft Establishment, Bedford (England). Aerodynamics Dept.
A CALCULATION METHOD FOR THE TURBULENT BOUNDARY LAYER ON AN INFINITE YAWED WING IN COMPRESSIBLE, ADIABATIC FLOW
P. D. Smith London Aeron. Res. Council 1974 27 p refs Supersedes RAE-TR-72193; ARC-34388
(ARC-CP-1268; RAE-TR-72193; ARC-34388) Avail: NTIS HC $3.75; HSMO 45p; PHI $1.95

A method is presented for the calculation of the compressible turbulent boundary layer both at the attachment line and over the surface of an infinite, yawed, thermally-insulated wing. The method uses the momentum integral and entrainment equations for three-dimensional compressible flow. A FORTRAN computer program, based upon the method, was written to calculate the boundary layer development on an infinite yawed wing of given section shape, sweep, and pressure distribution at a given Reynolds number, Mach number, stagnation temperature, and transition position. Author (ESRO)

N75-10025# Royal Aircraft Establishment, Bedford (England). Aerodynamics Dept.
THE EXTERNAL DRAG OF FUSELAGE SIDE INTAKES: RECTANGULAR INTAKES WITH COMPRESSION SURFACES VERTICAL
M. D. Dobson London Aeron. Res. Council 1974 80 p refs Supersedes RAE-TR-72202; ARC-34455
(ARC-CP-1269; RAE-TR-72202; ARC-34455) Avail: NTIS HC $4.75; HMSO £L1.25; PHI $4.90

Measurements of the external drag of rectangular intakes installed on the sides of a fuselage are presented. Results at subsonic speeds show that drag at full flow is independent of compression surface geometry. Substantial flow spillage may be achieved for little drag penalty provided that the intake throat Mach number is kept high by elevation of the compression surface. Spillage drag was found to be uniquely related to the inlet mass flow ratio (as distinct from capture mass flow ratio). Radius of the cowl lip was found to affect the drag of the intake at full flow but becomes less important as flow is reduced. Drag at full flow for intakes with swept end walls is lower than for a configuration in which they are unswept but the spillage drag rise is greater. At supersonic speeds the variation in full flow drag with compression surface geometry may be predicted from consideration of the changes in shock geometry but there is generally a small positive increment which is not accounted for in the calculation. Calculation methods based on theoretical shock geometry are found to over estimate spillage drag. Author (ESRO)

N75-10026# Aircraft Research Association, Ltd., Bedford (England).
RESULTS OF A SERIES OF WIND TUNNEL TESTS ON THE VICTOR B.Mk.2 AIRCRAFT AND A COMPARISON WITH DRAG ESTIMATES AND FULL SCALE FLIGHT DATA
J. I. Simper London Aeron. Res. Council 1974 54 p refs Supersedes ARC-33227
(Contract MIN-TEC-KC-49/25/CB/5/D)
(ARC-CP-1283; ARC-33227) Avail: NTIS HC $4.25; HMSO 85p; PHI $3.55

Wind tunnel measurements of drag for a 1/25 scale model of the Victor B.Mk.2 were compared with estimates and flight data. At wind tunnel Reynolds numbers, reasonable agreement is shown to exist between the estimated drag and an extrapolation to M = O, C sub L 1 = O from the lowest test Mach number and moderate C sub L, of the measured complete model drag. At full scale Reynolds numbers the standard of agreement between the extrapolated wind tunnel and full scale flight drag data is shown to depend on whether the wind tunnel or flight derived values are used, and the assumed drag of small excrescences not represented on the model. If certain assumptions are made then at low and moderate C sub L good agreement is shown to exist between the extrapolated wind tunnel and flight measured drags, and the wind tunnel tends to predict a later drag-rise than that measured in flight by delta M = 0.015 or less depending on the assumptions made. Author (ESRO)

N75-10027# Queen Mary Coll., London (England). Dept. of Aeronautical Engineering.
A TWO-DIMENSIONAL AEROFOIL OSCILLATING AT LOW FREQUENCIES IN HIGH SUBSONIC FLOW
D. Nixon Aeron. Res. Council 1974 68 p refs Supersedes ARC-34259
(ARC-CP-1285; ARC-34259) Avail: NTIS HC $4.25; HMSO £1.10; PHI 4.30

The integral equation formulation developed for the analysis of the high subsonic shock free flow past a steady two dimensional airfoil was extended to the problem of an airfoil oscillating in simple harmonic motion. The essential nonlinearities in the transonic potential equations were retained in the analysis. Results were obtained for the in and out of phase force and moment derivatives at the fundamental frequency for a NACA 0012 airfoil oscillating in pitch at a low reduced frequency in subcritical conditions. It was found that both the aerodynamic stiffness and damping derivatives are significantly affected by the transonic nonlinearities. Because of uncertainties of wind tunnel interference effects, it was not possible to compare these theoretical results with experimental results. Author (ESRO)

N75-10028# Cambridge Univ. (England). Dept. of Engineering.
PRESSURE DISTRIBUTION ON TWO WINGS WITH CURVED LEADING EDGES AT SUPERSONIC SPEEDS
K. Yegnanarayan London 1974 48 p refs Supersedes ARC-34293 Sponsored by Churchill Coll.
(ARC-R/M-3741; ARC-34293) Avail: NTIS HC $3.75; HMSO £ 1.66; PHI $6.75

Results are presented of a pressure study on the flat windward surfaces of two wings with curved, sharp leading edges. The leading edges of one of the wings are convex outwards, whereas those of the second are concave outwards. The wings were tested at nominal free stream Mach numbers of 2.5, 3.5 and 4.5. The results indicate that the changes in flow development due to the curvature of the leading edges are qualitatively similar at all the Mach numbers. In the case of the first wing, the spanwise pressure distribution changed considerably as the flow

developed downstream of the vortex; however, the changes in the spanwise pressure distribution on the wing with concave leading edge, though observable, were much less. The pressure distribution on the two wings was calculated using the concept of an equivalent delta wing, but modified to take into account the upstream effect. Comparisons with experiments show that the agreement is fairly good, except at very high incidences and over the outer half of the semi-span. Possible reasons for this discrepancy are discussed. An attempt was made to justify the definition of an equivalent delta wing based on a simple physical idea. Author (ESRO)

N75-10029# Royal Aircraft Establishment, Farnborough (England). Structures Dept.
SOME CALCULATIONS FOR AIR RESONANCE OF A HELICOPTER WITH NON-ARTICULATED ROTOR BLADES
J. C. A. Baldock London ARC 1974 33 p refs Supersedes RAE-TR-72083; ARC-34332
(ARC-R/M-3743; RAE-TR-72083; ARC-34332) Avail: NTIS HC $3.75; HMSO £ 1.20; PHI $4.90

An analysis of air resonance in the hover, and the solutions obtained for a helicopter with nonarticulated blades are described. It is shown that stability in air resonance depends critically on blade structural and aerodynamic parameters that are not easily estimated with the required accuracy and that a calculation technique requires careful, positive correlation with experiment before its accuracy can be accepted. The effectiveness of model rotor experiments for checking data was considered, and measurements of rotor impedances show promise of providing a useful basis for comparing with theoretical equivalents. The effect of an autostabilizer designed to counteract the conventional helicopter instabilities in pitch and roll was investigated. It was found that such an autostabilizer destabilizes the air resonance mode. Author (ESRO)

N75-10030# Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.
LOW-SPEED WING-TUNNEL MEASUREMENTS OF THE LIFT, DRAG AND PITCHING MOMENT OF A SERIES OF CROPPED DELTA WINGS
D. A. Kirby London ARC 1974 41 p refs Supersedes RAE-TR-72211; ARC-34598
(ARC-R/M-3744; RAE-TR-72211; ARC-34598) Avail: NTIS HC $3.75; HMSO £ 1.45; PHI $5.80

Measurements of lift, drag and pitching moment were made on a series of cropped delta wings of aspect ratio 1.4, 1.2, 1.0 and 0.8 formed successibely cropping a delta wing model of aspects ratio 1.6. These tests extended earlier work on sharp-edged slender wings of the same chordwise section and maximum thickness/-chord ratio, 4 0/6. Empirical curves were derived for predicting the low speed characteristics of slender wings at zero sideslip and test results on the cropped series were analyzed and compared with correlation curves. Differences were noted linked with the improved performance of a cropped delta compared with a pure delta planform of the same aspect ratio.
Author (ESRO)

N75-10031# European Space Research Organization, Paris (France).
ESTIMATION OF THE CHARACTERISTICS OF VARIOUS FLARE PROFILES
Manfred Rodewald Sep. 1974 41 p refs Transl. into ENGLISH of Abschaetzungen des prinzipiellen Verlaufs verschiedener Abfangbahnen, DLR-FB-74-21, DFVLR, 7 FEB. 1974
(ESRO-TT-89; DLR-FB-74-21) Avail: NTIS HC $3.75; DFVLR, Porz, West Ger. 11 DM

Exponential, parabolic, and optimum flare profiles were investigated for a simplified aircraft model. It is shown that increasing approach speeds and flight path angles require an extended flare phase. It is concluded that appropriately designed flare profiles allow for higher approaches. ESRO

N75-10032# Goodyear Aerospace Corp., Akron, Ohio.
SLOW DESCENT RECOVERY SYSTEM TECHNOLOGY STUDY AND DATA PROGRAM Final Report, Apr. - Oct. 1973
Frederick Bloetscher Apr. 1974 288 p refs
(Contract F33657-73-C-0470; AF Proj. 5970)
(AD-783268; GER-16010; AFFDL-TR-74-7) Avail: NTIS CSCL 01/3

A six-month parametric study program was conducted of performance, weight and volume characteristics of typical configurations of both the slow descending and loiter type systems suitable for lightweight expendable payloads released from aircraft or rockets. Typical configurations investigated were drag devices, rotors, gliders, powered gliders, free and tethered balloons. Descent systems were studied for descent velocities of 2, 4 and 8 FPS while loiter systems were considered for times ranging to 600 minutes for a payload range of 0.1 to 50 pounds and altitudes up to 50,000 feet. Volume which is related to SLODS (Slow Descent Systems) weights was considered to be the most important parameter for the investigation. (Modified author abstract) GRA

N75-10369 European Space Research Organization, Paris (France).
TIME-DEPENDENT METHODS FOR COMPUTING WALL EFFECTS IN TWO-DIMENSIONAL SUPERCRITICAL FLOW
Pierre Laval *In its* Aerospace Res. (ESRO-TT-40) Apr. 1974 p 34-66 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel No. 1973-5, ONERA 1973, p 275-288 (For availability see N75-10367 01-34)

N75-10370 European Space Research Organization, Paris (France).
ANALOG SIMULATION OF THE SMALL PERTURBATION EQUATION APPLIED TO TRANSONIC FLOWS
Georges Gaubert *In its* Aerospace Res. (ESRO-TT-40) Apr. 1974 p 67-93 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel No. 1973-5, ONERA 1973, p 289-299 (For availability see N75-10367 01-34)

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N75-10033 California Univ., Los Angeles.
A METHODOLOGY FOR DETERMINING THE FLIGHT SYSTEM MIX OF AN AIR TRANSFER ROUTE STRUCTURE Ph.D. Thesis
Harold Eugene Roland, Jr. 1974 351 p
Avail: Univ. Microfilms Order No. 74-22959

A modeling process is reported which is of immediate and primary use to the air carriers in determining their aircraft flight system mix for the long term profitability of their operating route structure. The principal exogenous variables are demand for service and technology level. The model is discrete and considers the majority of constraints imposed on such a system. The model can assimilate real aircraft in service today as well as higher technology aircraft of the future. The model serves both passenger and cargo demand with either a pair or triplet of aircraft. The triplet may occur on international routes where the third aircraft is a supersonic transport interacting competitively with subsonic transports. The model incorporates a fuel cost variation process with feedback loops to adjust both fare and demand. This feature allows an increase in fuel cost by an annual percentage greater than the general inflation rate of the remaining elements.
Dissert. Abstr.

N75-10034# Committee on Appropriations (U. S. Senate).
PROPOSED INTERNATIONAL AIR SHUTTLE, 1975
Washington GPO 1974 243 p refs Hearing before Subcomm. on Treasury, Postal Service, and General Govt. of Comm. on Appropriations, 93d Congr., 2d Sess., 20 Mar. 1974
(GPO-31-527) Avail: Subcomm. on Treasury, Postal Service, and General Govt.

Recommendations that a chartered international air shuttle be established to transport DOD and official government personnel on overseas assignments, in order to eliminate tariff inconsistencies

and unfairness, was debated before Congress. Information was submitted by the major airlines which reflected their concern that a duplication of services would adversely impact their operations, and that the air shuttle would cut into the already short supply of fuel available for aviation purposes. A.A.D.

N75-10035# National Transportation Safety Board, Washington, D.C.
THE ATTAINABLE GOAL IN AIRLINE SAFETY
John H. Reed 9 May 1974 10 p Presented at the spring meeting of the Assoc. of Local Transport Airlines, Toronto, 9 May 1974
Avail: NTIS HC $3.25

The safety record of scheduled air carrier service for the past 10 years is reviewed against a background of constant operational growth. It is shown that accident rates and fatality rates reveal a slightly downward trend. Evaluation of local airline fatal accidents establishes as primary causes: (1) pilot error; (2) other personnel errors; and (3) inclement, foggy weather conditions. The information loop between airlines, manufacturers, and the Federal Aviation Administration is the greatest single factor in air transportation safety. G.G.

N75-10036*# Scientific Translation Service, Santa Barbara, Calif.
OPERATIONAL EFFECTIVENESS OF TRANSPORT AIRCRAFT
N. N. Smirnov and I. K. Mulkidzhanov Washington NASA Sep. 1974 316 p refs Transl. into ENGLISH of the book "Ekspluatatsionnaya Tekhnologichnost Transportnykh Samoletov" Moscow, Transport Press, 1972 208 p.
(Contract NASw-2483)
(NASA-TT-F-810) Avail: NTIS HC $9.25 CSCL 01C

Problems in the theory and practice of maintainability of transport aircraft, considering the developmental trends in their maintenance and overhaul are discussed. Factors which determine maintainability, a system of quantitative indices for estimating maintainability, and methods of performing a technical determination of the indices are analyzed. The problems of establishing the general requirements for aviation technology, methods of collecting the necessary information, and methods of evaluating maintainability of aircraft during their operation and tests are discussed. Author

N75-10037# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.
ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA: US GENERAL AVIATION CALENDAR YEAR 1971
29 May 1974 200 p
(NTSB-ARG-74-2) Avail: NTIS HC $7.00 CSCL 01C

The Annual Review of Aircraft Accident Data is a statistical compilation published by the National Transportation Safety Board. The publication contains statistical information compiled from reports of 4,648 General Aviation accidents that occurred during the calendar year 1971. Included in the total number of accidents are 51 collisions between aircraft. By coding each aircraft involved in the collisions, an additional 51 records are produced, bringing the total accidents records to 4,699. This figure reflects the true number of pilots and aircraft involved in the accidents. Author

N75-10038*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SIMULATION STUDIES OF STOL AIRPLANE OPERATIONS IN METROPOLITAN DOWNTOWN AND AIRPORT AIR TRAFFIC CONTROL ENVIRONMENTS
Richard H. Sawyer and Milton D. McLaughlin Washington Nov. 1974 41 p refs
(NASA-TN-D-7740; L-9663) Avail: NTIS HC $3.75 CSCL 01E

The operating problems and equipment requirements for STOL airplanes in terminal area operations in simulated air traffic control (ATC) environments were studied. These studies consisted of Instrument Flight Rules (IFR) arrivals and departures in the New York area to and from a downtown STOL port, STOL runways at John F. Kennedy International Airport, or STOL runways at a hypothetical international airport. The studies were accomplished in real time by using a STOL airplane flight simulator. An experimental powered lift STOL airplane and two in-service airplanes having high aerodynamic lift (i.e., STOL) capability were used in the simulations. Author

N75-10039# Oak Ridge National Lab., Tenn.
TOTAL ENERGY USE FOR COMMERCIAL AVIATION IN THE US
E. Hirst Apr. 1974 15 p refs
(Contract W-7405-eng-26; Grant NSF AG-398)
(ORNL-NSF-EP-68) Avail: NTIS HC $3.25

The total energy impacts of commercial aviation in the United States are shown. Direct fuel use by commercial airplahds (1080 trillion Btu in 1971) amounts to 6% of direct fuel use for all domestic transportation, 1.6% of the total national energy budget. Indirect energy requirements are one-third as great as the direct fuel use. Thus, total energy demand for domestic commercial aviation in 1971 was 1450 trillion Btu, 2% of national energy use. Direct fuel savings due to adoption of airline conservation measures can be increased by one-third to account for the indirect energy savings. Some conservation measures, such as a reduction in short-haul flights, are likely to have larger energy savings, because short-haul flights involve higher maintenance costs, greater airport use, and higher passenger service costs on a passenger-mile basis than do longer flights. Other measures, such as reducing cruise speeds, are likely to have relatively small indirect energy savings. In all cases, the direct fuel savings can be increased by 20%. NSA

N75-10040# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Abteilung Flugverkehrswissenschaft.
ROUTING OF AIRCRAFT AND ECONOMICS OF FLIGHT OPERATIONS Ph.D. Thesis - Tech. Univ. Stuttgart [BEITRAG ZUM NETZUMLAUF VON FLUGZEUGEN UND ZUR WIRTSCHAFTLICHKEIT DES FLUGBETRIEBS]
Hanns-Juergen Peters 8 Mar. 1974 118 p refs In GERMAN; ENGLISH summary
(DLR-FB-74-25) Avail: NTIS HC $5.25; DFVLR, Porz, West Ger. 45 DM

The cost estimation was separated from establishing aircraft rotation within an airline network. An effective procedure for routing aircraft is given, based on well known methods of operations research. The economics of aircraft operation is determined by applying Lufthansa and Lockheed methods. An equivalent interaction of both aspects of aircraft operation causes improved efficiency of air transportation. A proposed solution is applied to a regional airline system model, yielding quantitative results. Author (ESRO)

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *Communications*.

N75-10041*# Research Triangle Inst., Research Triangle Park, N.C. Engineering Div.
IMPLEMENTATION OF AN EXPERIMENTAL PROGRAM TO INVESTIGATE THE PERFORMANCE CHARACTERISTICS OF OMEGA NAVIGATION Final Report
Ernest G. Baxa, Jr. Sep. 1974 279 p refs
(Contract NAS1-12043; RTI Proj. 43U-818)
(NASA-CR-132516) Avail: NTIS HC $8.75 CSCL 17G

A theoretical formulation of differential and composite OMEGA error is presented to establish hypotheses about the functional relationships between various parameters and OMEGA navigational errors. Computer software developed to provide for extensive statistical analysis of the phase data is described. Results from the regression analysis used to conduct parameter sensitivity studies on differential OMEGA error tend to validate the theoretically based hypothesis concerning the relationship between uncorrected differential OMEGA error and receiver separation

range and azimuth. Limited results of measurement of receiver repeatability error and line of position measurement error are also presented. Author

N75-10042*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
AN ADAPTIVE TECHNIQUE FOR A REDUNDANT-SENSOR NAVIGATION SYSTEM Ph.D. Thesis
Tze-Thong Chien Feb. 1972 261 p refs
(Contract NAS9-8242)
(NASA-CR-140313; T-560) Avail: NTIS HC $8.50 CSCL 17G

An on-line adaptive technique is developed to provide a self-contained redundant-sensor navigation system with a capability to utilize its full potentiality in reliability and performance. The gyro navigation system is modeled as a Gauss-Markov process, with degradation modes defined as changes in characteristics specified by parameters associated with the model. The adaptive system is formulated as a multistage stochastic process: (1) a detection system, (2) an identification system and (3) a compensation system. It is shown that the sufficient statistics for the partially observable process in the detection and identification system is the posterior measure of the state of degradation, conditioned on the measurement history. Author

N75-10043# Royal Aircraft Establishment, Farnborough (England).
AUTOMATIC FLYING OF CURVED APPROACH PATHS: A COMPUTER AND FLIGHT INVESTIGATION
R. B. Lumsden and N. Cooke Feb. 1974 63 p refs
(RAE-TR-73154; BR39684) Avail: NTIS HC $4.25

Computer studies and flight experiments are described which indicate the feasibility of transport aircraft (as represented by the Comet 3B) flying automatic approaches on paths curved in azimuth and elevation. The flight paths considered have radii of curvature from 1800 m to 3000 m in azimuth and the glide paths have maximum gradients from 3 deg to 6 deg. The effects of various terms in the autopilot control laws are discussed, along with performance in varying wind conditions.
Author (ESRO)

N75-10044# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
OPTIMAL LIGHT CHARACTERISTICS FOR BATTERY OPERATED NAVIGATION LIGHTS
J. Walraven and W. A. Lotens 1974 34 p refs In DUTCH; ENGLISH summary
(Contract A72/KM/143)
(IZF-1974-8) Avail: NTIS HC $3.75

The characteristics required for an optimal flash pattern for battery operated navigation lights were investigated. The variables examined were: (1) flash duration, (2) light-time percentage, and (3) flash grouping. Data were obtained concerning the effect of these variables on visual range, energy consumption, detectability, and the time to take a bearing on the light. It was found that for the given light source, an optimal flash can be obtained by using a light-time percentage of 10 to 20% and a flash duration of 200 msec. Grouping of the flashes turned out to be of minor importance in this case, both with respect to detectability and time to take a bearing. This implies that grouping may be used for encoding purposes without serious consequences for either signal detectability or time to take bearings. Author (ESRO)

N75-10045# Stanford Research Inst., Menlo Park, Calif.
DIODE BEACON TECHNIQUES Final Report, 31 May 1972 - 30 Sep. 1973
Ashok E. Gorwara Jun. 1974 144 p refs
(Contracts F30602-72-C-0444; AF Proj. 5556; SRI Proj. 1970)
(AD-783619; RADC-TR-74-147) Avail: NTIS CSCL 17/7

In recent years, there has been a great interest in physically small, low-cost, low-energy-consuming electronic markers for tagging materials and vehicles, for air traffic control on the ground, and for surveillance or tracking of personnel over a limited area. The purpose of the study was to investigate the state of the art in low-cost beacon components that will provide a target-like signal for a maximum range of five miles in various weather conditions when they are illuminated by search, tracking, or surface-detection radars. (Modified author abstract) GRA

N75-10046# Army Electronics Command, Fort Monmouth, N.J. Communications/ADP Lab.
INTERFERENCE WITH AIRCRAFT RADIO NAVIGATION AND COMMUNICATIONS BY PRECIPITATION STATIC FROM ICE AND SNOW CLOUDS: ELECTROSTATIC WIND TUNNEL EXPERIMENTS Final Report, Mar. - Jul. 1974
Kurt Ikrath Aug. 1974 43 p refs
(DA Proj. 1T1-61101-A-91A)
(AD-784623; ECOM-4244) Avail: NTIS CSCL 20/14

The effects of precipitation static noise interference with the reception of radio navigation and communication signals on aircraft flying through ice and snow clouds were generated with an electrostatic wind tunnel. Electrical type antennas were found to be highly susceptible to precipitation static noise fields, whereas magnetic antennas were found to be practically immune to these noise fields unless the magnetic antennas were in close proximity to metal surfaces. Author (GRA)

N75-10047# Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
AN AZIMUTH DETERMINATION SYSTEM USING THE NAVY NAVIGATION SATELLITES
J. R. Albertine May 1974 86 p
(Contract N00017-72-C-4401)
(AD-784375; APL-TG-1235) Avail: NTIS CSCL 17/7

A system has been developed using the Navy navigation satellites that can provide azimuth information on a worldwide basis. This capability is particularly useful in the polar regions where conventional navigation systems based on gyrocompasses experience alignment difficulties. In this newly developed system, two antennas separated by 50 to 100 meters are used as an interferometer array to measure phase differences of a satellite signal. Based on this information, it is possible to determine the azimuth of the baseline connecting the two receiving antennas. Author (GRA)

N75-10048# Air Force Academy, Colo. Frank J. Seiler Research Lab.
A PRACTICAL ON-LINE FILTER TO PROCESS GYROCOMPASS DATA Final Scientific Report, Dec. 1971 - Jun. 1974
Ronald E. Janosko Jul. 1974 30 p refs
(AF Proj. 7904)
(AD-783250; SRL-TR-74-0012) Avail: NTIS CSCL 17/7

The problem of determining true azimuth from noisy gyrocompass data is presented. First, an adaptive filter is shown to be able to correct the gyrocompass output for environmental effects. Second, it is demonstrated that a low-pass digital filter is able to reduce the measurement noise in the raw data so that it can be properly passed through the adaptive estimator. Computer simulations are presented that indicate that the proposed digital and adaptive filter perform as anticipated.
Author (GRA)

N75-10049# Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
C-LAD: A LOW COST LORAN-C ASSIST DEVICE. VOLUME 1: HARDWARE Final Report
R. C. Moore, L. M. Marshall, Jr., and C. R. Edwards Jun. 1974 85 p
(Contract DOT-CG-23671-B)
(AD-784312; APL/JHU-CP-034-A) Avail: NTIS CSCL 17/7

C-LAD, a low-cost Loran-C assist device, is a special-purpose digital computer designed to enhance the use of Loran-C on board ships. Without some form of data processing, the hyperbolic coordinate system of Loran-C is awkward to use; C-LAD provides the necessary data processing by computing range and bearing to a selected destination using hyperbolic Loran-C time difference coordinates as inputs. C-LAD should have wide application as a navigation aid for small ships because of its low cost. Volume I documents the C-LAD hardware and interfaces, Volume II describes the system software, and Volume III details the C-LAD operating procedure. Author (GRA)

N75-10050# Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
C-LAD: A LOW COST LORAN-C ASSIST DEVICE. VOLUME 2: SOFTWARE Final Report

R. C. Moore, L. M. Marshall, Jr., and C. R. Edwards Jun. 1974 151 p refs
(Contract DOT-CG-23671-B)
(AD-784313; APL/JHU-CP-034-B) Avail: NTIS CSCL 17/7

The volume provides a description of the string control language (SCL) developed by the authors for the C-LAD processor. It describes the operating executive routines and the utility subroutines. It provides a troubleshooting flow chart and test programs to be used with the 16-word PROM simulator. GRA

N75-10051# Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
C-LAD: A LOW COST LORAN-C ASSIST DEVICE. VOLUME 3: OPERATING PROCEDURE Final Report
R. C. Moore, L. M. Marshall, Jr., and C. R. Edwards Jun. 1974 27 p
(Contract DOT-CG-23671-B)
(AD-784314; APL/JHU-CP-034-C) Avail: NTIS CSCL 17/7

The operating principles of the low cost Loran-C assist system for ship navigation are discussed. The system operates in two modes: (1) navigate mode and (2) monitor mode. Specific instructions for operating the system in both modes are provided. Maps of a typical Loran problem are shown to demonstrate the coverage available in the North Atlantic ocean. GRA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N75-10052 Mashinstoyeniye, Moscow (USSR).
TABULATED VALUES OF COMBINATIONS OF CYCLIC AND HYPERBOLIC FUNCTIONS
I. V. Ananyev and N. I. Yegorsheva 1974 322 p In RUSSIAN
Copyright. Avail: Issuing Activity

Tables are presented for cyclic and hyperbolic functions which are important in the calculation of oscillations and the stability of construction elements in aircraft. The tables are composed on the assumption that small intervals from zero to six radians allow the calculation of the fundamental oscillations of elements in aviation construction and higher frequencies. Author

N75-10053# Advisory Group for Aerospace Research and Development, Paris (France).
CRITICAL REVIEW OF METHODS TO PREDICT THE BUFFET CAPABILITY OF AIRCRAFT
Helmut John (Messerschmitt-Boelkow-Blohm G.m.b.H., Munich) Sep. 1974 33 p refs
(AGARD-R-623) Avail: NTIS HC $3.75

A general survey of methods for predicting the buffet penetration capability of aircraft of various configurations is presented. The influence that limiting factors may have on the performance of a fighter aircraft is analyzed. The sensitivity of turn rates at subsonic, transonic, and supersonic speeds are examined. The effects on structural aspects to include fatigue life of the airframe and weapon system performance are explained. Graphs of typical buffeting conditions are included. Author

N75-10054*# Advisory Group for Aerospace Research and Development, Paris (France).
TRANSONIC BUFFET BEHAVIOR OF NORTHROP F-5A AIRCRAFT
Chintsun Hwang (Northrop Corp., Hawthorne, Calif.) and W. S. Pi (Northrop Corp., Hawthorne, Calif.) Sep. 1974 33 p refs (Contract NAS2-6475)
(NASA-CR-140939; AGARD-R-624) Avail: NTIS HC $3.75 CSCL 01C

Flight tests were performed on an F-5A aircraft to investigate the dynamic buffet pressure distribution on the wing surfaces and the responses during a series of transonic maneuvers called wind-up turns. The conditions under which the tests were conducted are defined. The fluctuating buffet pressure data on the right wing of the aircraft were acquired by miniaturized semiconductor-type pressure transducers flush mounted on the wing. Processing of the fluctuating pressures and responses included the generation of the auto- and cross-power spectra, and of the spatial correlation functions. An analytical correlation procedure was introduced to compute the aircraft response spectra based on the measured buffet pressures. Author

N75-10055*# Kanner (Leo) Associates, Redwood City, Calif.
CRITICAL ANALYSES AND LABORATORY RESEARCH WORK AT THE STAGE OF AIRCRAFT PRELIMINARY DESIGN
C. Lievens and P. Poisson-Quinton Washington NASA Oct. 1974 62 p Transl. into ENGLISH from the AGARD report AGARD-CP-147-Vol-1
(Contract NASw-2481)
(NASA-TT-F-15996; AGARD-CP-147-Vol-1) Avail: NTIS HC $4.25 CSCL 01C

At the preliminary aircraft design stage, the design offices rely simultaneously on experience gained with previous projects, sophisticated computations, results of tests ordered from laboratories, a well informed documentation center, and the intuitive faculties of the project officer. On the other hand, the research center must forecast the main trends of aeronautical techniques in due time, in order to provide the government services and the manufacturers with the maximum of information. But it should also possess a very short response time capability in order to satisfy urgent requests. This requirement calls for large resources, as far as specialized manpower and up-to-date laboratories are concerned. Author

N75-10056*# Kanner (Leo) Associates, Redwood City, Calif.
INTERFERENCE OF A SWEPTBACK WING AND THE FUSELAGE AT TRANSONIC SPEEDS
L. A. Potapova Washington NASA Oct. 1974 8 p refs Transl. into ENGLISH from Uch. Zap. TsAGI (USSR), v. 4, no. 3, 1974 p 101-104
(Contract NASw-2481)
(NASA-TT-F-15993) Avail: NTIS HC $3.25 CSCL 01B

Calculation results are presented for the interference of a flat sweptback wing and a cylindrical fuselage at transonic speeds and small angles of attack. A random law of spanwise load distribution is used. Results are graphically presented and compared with experimental data. Author

N75-10057*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
OPTIMAL CONTROL THEORY INVESTIGATION OF PROP-ROTOR/WING RESPONSE TO VERTICAL GUST
Juanita K. Frick and Wayne Johnson Sep. 1974 118 p refs Prepared in cooperation with Army Air Mobility R and D Lab., Moffett Field, Calif.
(NASA-TM-X-62384) Avail: NTIS HC $5.25 CSCL 01C

Optimal control theory is used to design linear state variable feedback to improve the dynamic characteristics of a rotor and cantilever wing representing the tilting proprotor aircraft in cruise flight. The response to a vertical gust and system damping are used as criteria for the open and closed loop performance. The improvement in the dynamic characteristics achievable is examined for a gimballed rotor and for a hingeless rotor design. Several features of the design process are examined, including: (1) using only the wing or only the rotor dynamics in the control system design; (2) the use of a wing flap as well as the rotor controls for inputs; (3) and the performance of the system designed for one velocity at other forward speeds. Author

N75-10058*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TECHNIQUES FOR IMPROVING THE STABILITY OF SOFT INPLANE HINGELESS ROTORS
Robert A. Ormiston Oct. 1974 58 p refs Prepared in cooperation with Army Air Mobility R and D Lab., Moffett Field, Calif.
(NASA-TM-X-62390) Avail: NTIS HC $4.25 CSCL 01C

The influence of basic parameters that govern flap lag stability of hingeless rotor blades in hover is reviewed, and potential methods are studied for improving the lead lag damping of soft inplane configurations for low thrust conditions. These conditions are relevant for ground and air resonance stability of coupled

rotor body dynamic systems. Results indicate that the isolated rotor blade lead lag damping can be usefully increased by a combination of flap lag elastic coupling and pitch lag coupling. For a typical soft inplane configuration, 6% of critical damping can be obtained for moderate pitch lag coupling. For large values of the coupling parameters, the lead lag frequency is substantially reduced at high pitch angles and airfoil stall effects also reduce the lead lag damping. Author

N75-10059*# Kanner (Leo) Associates, Redwood City, Calif.
PERFORMANCE IMPROVEMENT THROUGH CONTROL CONFIGURED VEHICLE CONCEPT
G. Loebert Washington NASA Nov. 1974 37 p refs Transl. into ENGLISH from the German reports DGLR-72-094 and UFE-895-72(OE)
(Contract NASw-2481)
(NASA-TT-F-15998; DGLR-72-094; UFE-895-72(OE)) Avail: NTIS HC $3.75 CSCL 01C

The possibility of obtaining high potential power increases at only small additional costs by employing artificial instead of natural stabilization is demonstrated. It is shown that if the requirement of static aerodynamic stability is eliminated, the drag polars and thus flight performance can be significantly improved. This improvement occurs mainly in the form of an increase in specific excess power at high lift coefficients and in an increase in the attainable maximum lift coefficients. The dynamic flight characteristics of such aircraft can be made equal to or better than the characteristics of aerodynamically stable aircraft through appropriate artificial stabilization. By incorporating suitable redundancies and other provisions, the flight safety of conventional mechanically controlled aircraft can be achieved. Author

N75-10060*# Kanner (Leo) Associates, Redwood City, Calif.
THE CCV CONCEPT AND SPECIFICATIONS
J. C. Wanner Washington NASA Oct. 1974 19 p Transl. into ENGLISH from the AGARD report AGARD-CP-147-Vol-1
(Contract NAS-2481)
(NASA-TT-F-15997; AGARD-CP-147-Vol-1) Avail: NTIS HC $3.25 CSCL 01C

The CCV concept consists in taking into account, at the design stage of a new aircraft, the possibilities offered by four systems: Static stability compensation, maneuver load control, active ride control and active flutter control. The CCV concept could be summed up as follows: To take advantage of the latest technical advances in electronics and to make use of new types of control surfaces to make the optimum compromise between performance, handling qualities, lifetime and cost. One of the results of this philosophy is the abandonment of aircraft natural stability requirements. Author

N75-10061*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ANALYSIS OF A FLARE-DIRECTOR CONCEPT FOR AN EXTERNALLY BLOWN FLAP STOL AIRCRAFT
David B. Middleton Washington Nov. 1974 25 p refs
(NASA-TN-D-7760; L-9572) Avail: NTIS HC $3.25 CSCL 01C

A flare-director concept involving a thrust-required flare-guidance equation was developed and tested on a moving-base simulator. The equation gives a signal to command thrust as a linear function of the errors between the variables thrust, altitude, and altitude rate and corresponding values on a desired reference flare trajectory. During the simulator landing tests this signal drove either the horizontal command bar of the aircraft's flight director or a thrust-command dot on a head-up virtual-image display of a flare director. It was also used as the input to a simple autoflare system. An externally blown flap STOL (short take-off and landing) aircraft (with considerable stability and control augmentation) was modeled for the landing tests. The pilots considered the flare director a valuable guide for executing a proper flare-thrust program under instrument-landing conditions, but were reluctant to make any use of the head-up display when they were performing the landings visually. Author

N75-10062*# National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
EXPERIMENTAL DETERMINATION OF AIRPLANE MASS AND INERTIAL CHARACTERISTICS
Chester H. Wolowicz and Roxanah B. Yancey Washington Oct. 1974 66 p refs
(NASA-TR-R-433; H-814) Avail: NTIS HC $4.25 CSCL 01C

Current practices are evaluated for experimentally determining airplane center of gravity, moments of inertia, and products of inertia. The techniques discussed are applicable to bodies other than airplanes. In pitching- and rolling-moment-of-inertia investigations with the airplane mounted on and pivoted about knife edges, the nonlinear spring moments that occur at large amplitudes of oscillation can be eliminated by using the proper spring configuration. The single-point suspension double-pendulum technique for obtaining yawing moments of inertia, products of inertia, and the inclination of the principal axis provides accurate results from yaw-mode oscillation data, provided that the sway-mode effects are minimized by proper suspension rig design. Rocking-mode effects in the data can be isolated. Author

N75-10063# Boeing Vertol Co., Philadelphia, Pa.
MODEL 301 HLH/ATC (HEAVY LIFT HELICOPTER/ ADVANCED TECHNOLOGY COMPONENT) TRANSMISSION NOISE REDUCTION PROGRAM Final Report
R. Hartman and R. Bagley May 1974 175 p refs
(Contract DAAJ01-71-C-0840)
(AD-784132; USAAMRDL-TR-74-58) Avail: NTIS CSCL 01/3

The report presents the results of a transmission noise reduction program. The emphasis of the program is to reduce transmission noise at its source. The program included a dynamic test of a CH-47C helicopter transmission with internal instrumentation to measure strains, displacements, and accelerations of rotating components and external instrumentation to measure case acceleration and noise levels. Test results were used to verify prediction methodology which in turn was used to analyze the dynamic response of the Heavy Lift Helicopter (HLH) transmission components. (Modified author abstract) GRA

N75-10064# McDonnell-Douglas Corp., St. Louis, Mo.
HIGH ACCELERATION COCKPITS FOR ADVANCED FIGHTER AIRCRAFT. VOLUME 1: PROGRAM SUMMARY Final Report, 1 Apr. - 14 Dec. 1973
James M. Sinnett May 1974 56 p refs
(Contract F33615-73-C-3067; AF Proj. 6190)
(AD-783600; MDC-A2631-Vol-1; AFFDL-TR-74-48-Vol-1)
Avail: NTIS CSCL 01/3

A high acceleration cockpit design integration program was conducted for an advanced fighter concept with direct lift and direct side force capabilities. Program efforts included an assessment of basic pilot tasks in fighter mission, using the configuration direct force and high acceleration design features. Cockpit functional capabilities were tailored to satisfy operational needs, providing for normal flight and combat phases of the mission. Several configuration design alternatives were evaluated by USAF pilots in a static simulation cockpit evaluation phase. Resulting objective and subjective measures allowed ranking of configuration concepts. Several principal areas for future high acceleration cockpit development were defined. Author (GRA)

N75-10065# McDonnell-Douglas Corp., St. Louis, Mo.
HIGH ACCELERATION COCKPITS FOR ADVANCED FIGHTER AIRCRAFT. VOLUME 2: CREW STATION DESIGN/INTEGRATION Final Report, 1 Apr. - 14 Dec. 1973
Robert E. Mattes, Leslie N. Edgington, and James Roberts, Jr. May 1974 79 p refs
(Contract F33615-73-C-3067; AF Proj. 6190)
(AD-783601; MDC-A2631-Vol-2; AFFDL-TR-74-48-Vol-2)
Avail: NTIS CSCL 01/3

A high acceleration cockpit design integration program was conducted for an advanced fighter concept with direct lift and side force capabilities. Program efforts included an assessment of required cockpit controls and displays considering both functional requirements and basic pilot tasks in a fighter mission. Cockpit functional capabilities were tailored to satisfy operational needs considering the integration of an articulating ejection seat and fly-by-wire side arm controllers. Several configuration design alternatives were constructed for subsequent evaluation by USAF pilots in a static design aid evaluation phase. (Modified author abstract) GRA

N75-10066# McDonnell-Douglas Corp., St. Louis, Mo.
HIGH ACCELERATION COCKPITS FOR ADVANCED FIGHTER AIRCRAFT. VOLUME 3: TEST PLAN Final Report, 1 Apr. - 14 Dec. 1973
Carl F. Asiala and Thomas J. Quinn May 1974 65 p refs
(Contract F33615-73-C-3067; AF Proj. 6190)
(AD-783602; MDC-A2631-Vol-3; AFFDL-TR-74-48-Vol-3) Avail: NTIS CSCL 01/3

A high acceleration cockpit design and integration program was conducted, using a full scale design aid. Alternate configurations were compared using this full scale design aid in a formally structured evaluation including mission related task elements. Crew station characteristics were thus related to operator needs in a mission context for advanced fighter concepts. Author (GRA)

N75-10067# McDonnell-Douglas Corp., St. Louis, Mo.
HIGH ACCELERATION COCKPITS FOR ADVANCED FIGHTER AIRCRAFT. VOLUME 4: TEST RESULTS Final Report, 1 Apr. - 14 Dec. 1973
Carl F. Asiala and Thomas J. Quinn May 1974 93 p refs
(Contract F33615-73-C-3067; AF Proj. 6190)
(AD-783603; MDC-A2631-Vol-4; AFFDL-TR-74-48-Vol-4) Avail: NTIS CSCL 01/3

A high acceleration cockpit design test/evaluation program was conducted, using a full scale design aid. Alternate configurations were compared using this full scale design aid in a formally structured evaluation including mission related task elements. Test criteria considered evaluation of control/display and cockpit design options, including seat location, motion, and pilot anthropometry, with a balance between the physical and operational test measures and objectives using Air Force provided pilot subjects. Author (GRA)

N75-10068# Naval Postgraduate School, Monterey, Calif.
TWO DIMENSIONAL ANALYSIS OF FLUID-STRUCTURE INTERACTION BY METHOD OF FINITE DIFFERENCES: HYDRAULIC RAM, THE FUEL TANK PROBLEM M.S. Thesis
John Charles Bitzberger Jun. 1974 73 p refs
(AD-783839) Avail: NTIS CSCL 01/3

As part of an ongoing research program at the Naval Postgraduate School concerned with aircraft vulnerability and, in particular, the Hydraulic Ram phenomenon, two FORTRAN IV computer codes were written to analyze in two dimensions problems concerning structure-fluid interaction. This thesis presents the method selected for solution, details the codes written and presents test cases and example problems. User's instructions and program listings for both codes are also included. Author (GRA)

N75-10069# Kaman Aerospace Corp., Bloomfield, Conn.
ELASTIC PITCH BEAM TAIL ROTOR OPERATIONAL SUITABILITY INVESTIGATION Final Reoprt
Alfred S. Falcone, Frank Clark, and Paul Maloney Jul. 1974 129 p refs
(Contract DAAJ02-71-C-0063; DA Proj. 1F2-62203-AH-86)
(AD-784595; R-1207; USAAMRDL-TR-74-60) Avail: NTIS CSCL 01/3

The work under this contract was performed to ascertain the operational suitability of the Elastic Pitch Beam Tail Rotor being developed under Contract DAAJ02-72-C-0006 and to enhance its performance by selection of an optimized protective coating system and leading-edge erosion guard. Adiprene L-167 was selected for the protective coating based on the protection afforded to the GRP substrate in reverse-bending fatigue under cyclic environmental exposure of humidity, solar simulation, cold, and heat. Spring rate test performed on the GRP spar assembly at various levels of CF loading from -65F to 160F with and without exposure to environmental cycling disclosed spring rate changes within 15 percent for the temperature extreme tested. (Modified author abstract) GRA

N75-10070# Air Force Armament Lab., Eglin AFB, Fla.
AERODYNAMIC SYMMETRY OF AIRCRAFT AND GUIDED MISSILES Final Report, Jul. - Dec. 1974
Peter H. Zipfel Jul. 1974 23 p
(AD-784254; AFATL-TR-74-121) Avail: NTIS CSCL 01/1

A theory is developed that takes advantage of the inherent configurational symmetries of aircraft and guided missiles to eliminate some force and moment derivatives. Starting with the Principle of Material Indifference, tensor analysis is employed to derive two simple conditions for vanishing aerodynamic derivatives. The results apply to derivatives of arbitrary order, taken with respect to linear and angular velocities, linear accelerations, and control surface deflections. Two charts are presented that sift out the vanishing derivatives up to second order for missiles with tetragonal symmetry and up to third order for aircraft with reflectional symmetry. Author (GRA)

N75-10071# Texas Instruments, Inc., Dallas. Equipment Group.
A CONCEPTAUL DEFINITION STUDY FOR A DIGITAL AVIONICS INFORMATION SYSTEM (APPROACH 2), VOLUME 1 Final Report, 1 Feb. - 30 Jun. 1973
C. T. Brodnax Mar. 1974 376 p refs
(Contract F33615-73-C-1156)
(AD-780581/5; AFAL-TR-73-427-Vol-1) Avail: NTIS HC $10.25 CSCL 01/3

The report covers the digital avionics information system (DAIS) definition study which was intended to define the concepts for low cost avionics for the 1980s aircraft. ADAIS core was defined to consist of processor ensemble, controls/displays, information transfer system, and software. The application of this core to solve the avionics problems was addressed and the required characteristics of each core element defined. In addition to solving the avionics problems, it was found that the DAIS core had great potential for increasing systems maintenance capability while reducing AGE requirements. DAIS must be designed to meet these requirements, as opposed to adding onto an existing system, if the full capability is to be achieved. Author (GRA)

N75-10072# Texas Instruments, Inc., Dallas. Equipment Group.
A CONCEPTUAL DEFINITION STUDY FOR A DIGITAL AVIONICS INFORMATION SYSTEM (APPROACH 2). VOLUME 2: APPENDIXES A THRU D Final Report, 1 Feb. - 30 Jun. 1973
C. T. Brodnax Mar. 1974 457 p refs
(Contract F33615-73-C-1156)
(AD-780582/3; AFAL-TR-73-427-Vol-2) Avail: NTIS HC $11.50 CSCL 01/3

The components of a digital avionics information system are analyzed. The subjects discussed are: (1) parameter transformation matrix, (2) mathematics flow, (3) display/control partitioning and control panel data sheets, and (4) display/control interaction matrices. Author

N75-10073# Ohio State Univ., Columbus. Dept. of Mechanical Engineering.
DEVELOPMENT OF ACCELERATED LIFE TESTING TECHNIQUES FOR GENERAL FAILURE MODES OF AIRCRAFT HARDWARE Final Report, 1 Jan. - 31 Dec. 1973
Jack A. Collins and Ben Tarver Hagan, Jr. May 1974 330 p refs
(Contract DAAJ02-73-C-0023; DA Proj. 1F1-62203-A-119)
(AD-784188; USAAMRDL-TR-74-36) Avail: NTIS CSCL 01/3

The objective of the investigation was to determine the feasibility of developing reliable accelerated life testing methods for aircraft hardware, based on currently documented failure case histories. Over 240 case histories involving more than 500 individual parts were categorized according to failure mode, elemental mechanical function, and corrective action employed. A three-dimensional failure-experience cell matrix was developed to implement the organization and analysis of the data. Efforts to quantitatively evaluate corrective action effectiveness were hampered by a lack of quantitative data, but a qualitative evaluation was accomplished. (Modified author abstract) GRA

N75-10074# Lord Kinematics, Erie, Pa.
ENDURANCE TESTING OF AN LM-726-4 ELASTOMERIC PITCH CHANGE BEARING
David L. Myers Jun. 1974 75 p refs
(Contract DAAJ02-72-C-0091; DA Proj. 1F1-63204-DB-38)

(AD-784140; USAAMRDL-TR-74-35) Avail: NTIS CSCL 01/3

Presented in the report are the results of a 2000-hour endurance test on the LM-726-4 elastomeric pitch change bearing designed for the all-elastomeric rotor in the AH-1G helicopter. The LM-726-4 is an improved version of a previously tested pitch change bearing incorporating several design modifications with the goal of improving fatigue life. Testing was conducted to form a basis for determining the airworthiness of the bearing in terms of expected reliability and inspection and replacement criteria. (Modified author abstract) GRA

N75-10075# United Aircraft Corp., Stratford, Conn. Sikorsky Aircraft Div.

INVESTIGATION OF THE EFFECTS OF BLADE STRUCTURAL DESIGN PARAMETERS ON HELICOPTER STALL BOUNDARIES Final Report

R. H. Blackwell and G. L. Commerford May 1974 157 p refs

(Contract DAAJ02-72-C-0105; DA Proj. 1F1-62208-AA-82)

(AD-784594; USAAMRDL-TR-74-25) Avail: NTIS CSCL 01/3

An experimental and analytical study was conducted to determine the effects of blade structural design parameters on the stall-related operating boundaries of helicopter main rotors. Emphasis was placed on the effects of blade torsional properties on the buildup of vibratory control loads in stall. The analytical methods used in the study were evaluated through correlation with data for two full-scale rotors and data obtained on a two-dimensional airfoil system whose torsional dynamics simulated those of a rotor blade. (Modified author abstract) GRA

N75-10076# Naval Academy, Annapolis, Md.

OPTIMUM RATE OF CLIMB FOR HIGH PERFORMANCE AIRCRAFT

Ray P. Craig 21 May 1974 33 p refs

(AD-784112; USNA-TSPR-53) Avail: NTIS CSCL 01/2

The general aircraft performance problem is considered from the point of view of the balance of forces on an aircraft. The fundamental performance equation yields by use of calculus of variations a closed form equation for the velocity altitude relationship which represent the optimum time climb path. Application of this equation to an operational jet aircraft, the F-4J, yields an actual solution in close agreement with the generally accepted path. This work is done on the assumption that the thrust of a jet engine can be described by a simple quadratic expression. (Modified author abstract) GRA

N75-10077# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

A STUDY OF THE DAMPING CHARACTERISTICS ON MODELS OF SUPERSONIC AIR LINES AT SUPERSONIC SPEEDS

N. N. Tyunin and M. V. Ushakov 24 Jul. 1974 11 p refs Transl. into ENGLISH of Tr. Rizhskii Inst. Inzh. Gradzhanskoi Aviatsii (USSR), no. 197, 1971 p 58-65

(FTD Proj. T74-01-12)

(AD-784259; FTD-HT-23-708-74) Avail: NTIS CSCL 20/4

The article presents the results of an experimental study of the damping moment coefficients of the configuration of supersonic airliner models with small wing aspect ratios in a supersonic wind tunnel. A comparison of experimental and calculated data is presented. GRA

N75-10078# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DETERMINATION OF THE FORCES IN THE RETRACTOR OF A THREE-DIMENSIONAL LANDING GEAR MECHANISM

I. M. Mitryaev 14 Aug. 1974 17 p ref Transl. into ENGLISH from Tr. Kaz. Aviats. Inst. (USSR), no. 81, 1963 p 35-44

(AF Proj. 1369)

(AD-784257; FTD-HT-23-788-74) Avail: NTIS CSCL 01/3

Three-dimensional mechanisms of the link type have received broad application for aircraft with retractable landing gear along the span. A number of works has been dedicated to the investigation of these types of mechanisms. Questions of the kinematics and the determination of the forces in the retractor are examined in the present paper. GRA

N75-10079# Army Electronics Command, Fort Monmouth, N.J.

A STUDY OF STABILIZATION TECHNIQUES FOR SMALL, FIXED-WING, REMOTELY PILOTED AIRCRAFT Final Report

A. W. Campagna and R. E. Pribyl Aug. 1974 124 p

(DA Proj. 67372512-K-2101)

(AD-784109; ECOM-4239) Avail: NTIS CSCL 01/3

This report is concerned with the dynamic response of small, fixed wing RPV's to atmospheric disturbances. Several alternative control techniques were modeled and implemented in a hybrid simulation, and an assessment of relative performance was made. Author (GRA)

N75-10080# Arinc Research Corp., Annapolis, Md.

INTERSERVICE UTILITY HELICOPTER RELIABILITY AND MAINTAINABILITY COMPARATIVE ANALYSIS Final Report, Jan. 1972 - Apr. 1974

D. J. Hoffman Jun. 1974 33 p ref

(Contract DAAJ02-71-D-0001; DA Proj. 1F1-62205-A-119)

(AD-784177; OB22-02-1-1292; USAAMRDL-TR-74-43) Avail: NTIS CSCL 01/3

The comparative reliability and maintainability (R and M) performance of Army, Air Force, and Navy helicopters on an interservice basis was investigated. The report presents a management summary of the approach taken to correlate and analyze the performance data on systems, subsystems, assemblies, and parts used in common by the three services, as well as data on common functional applications of equipments. The results of the investigation are presented, with explanations of the performance differences and similarities. The study encompassed the development and implementation of the procedures for performing an interservice helicopter analysis on a very small selected sample of components from the Army's UH-1H; the Air Force's UH-1F, TH-1F, and UH-1P; and the Navy's UH-1E helicopters. (Modified author abstract) GRA

N75-10081# Bell Helicopter Co., Fort Worth, Tex.

LOW TEMPERATURE TESTING OF AN AH-1G HELICOPTER EQUIPPED WITH ELASTOMERIC FLAPPING AND FEATHERING BEARINGS IN THE MAIN ROTOR Final Report, 22 Oct. - 17 Nov. 1973

B. P. White Jul. 1974 40 p refs

(Contract DAAJ02-72-C-0114; DA Proj. 1F1-63205-DB-38)

(AD-784189; BHC-299-099-672; USAAMRDL-TR-74-54) Avail: NTIS CSCL 01/3

Low-temperature testing of an AH-1G helicopter equipped with a main rotor incorporating elastomeric flapping and feathering bearings was conducted in the McKinley Climatic Laboratory at Elgin AFB, Florida. The purpose of the test was to determine the low-temperature service suitability of the elastomeric bearings. (Modified author abstract) GRA

N75-10082# Boeing Vertol Co., Philadelphia, Pa.

TECHNOLOGY DEVELOPMENT REPORT: RESULTS OF STATIC ELECTRICITY DISCHARGE SYSTEM TESTS (ACTIVE AND PASSIVE) HEAVY LIFT HELICOPTER Final Report

John B. Solak and Gregory J. Wilson May 1974 232 p refs

(Contract DAAJ01-71-C-0840)

(AD-784130; T301-10194-1; T301-10194-2;

USAAMRDL-TR-74-22) Avail: NTIS CSCL 01/3

The document presents the findings of a three-phase program consisting of laboratory tests, ground tests, and a full-scale flight test program to evaluate methods for active dissipation of the static electricity buildup on the Heavy Lift Helicopter (HLH). Remote helicopter-borne electric field mills were also evaluated as sensors of the electrical potential between the hovering helicopter and the ground. Flight tests were conducted on a CH-47 helicopter, since the HLH is currently in its development stage. This document also presents the final results of the static electricity drainage tests for the Heavy Lift Helicopter (HLH) Advanced Technology Component (ATC) development program. (Modified author abstract) GRA

N75-10083# Honeywell, Inc., Minneapolis, Minn. Government and Aeronautical Products Div.
YAW AXIS STABILITY AUGMENTATION SYSTEM FLIGHT TEST REPORT Final Report, 1 Jun. 1972 - 30 Nov. 1973
Harvey Ogren, Donald Sotanski, and LeRoy Genaw Jun. 1974 111 p refs
(Contract DAAJ02-72-C-0111)
(AD-784134; USAAMRDL-TR-74-39) Avail: NTIS CSCL 01/3

The report describes the design and flight tests of a hydrofluidic yaw stability augmentation system (SAS) for an OH-58A helicopter. The design objective was to improve stability characteristics in yaw for all flight conditions from hover to 120 kn. The yaw SAS, which initially featured only high-passed yaw rate feedback, was installed in an OH-58A helicopter and flight tested in 1972. Performance at forward flight speeds was satisfactory; but at hover, yaw rates were excessive. The system was then modified to add a straight-through yaw rate feedback term. Flight tests of this configuration were conducted from October-December 1973. Results were satisfactory.
Author (GRA)

N75-10084# Army Land Warfare Lab., Aberdeen Proving Ground, Md.
HELICOPTER DROPSIGHT Final Report
Neal C. Wogsland May 1974 19 p
(AD-784551; LWL-TR-74-29) Avail: NTIS CSCL 19/5

The Helicopter Dropsight was developed for use when hand dropping unattended ground sensors and other hardware from UH-1D/H helicopters. It consists of a simple cross hair mounted in a ring that projects outside the helicopter on an arm attached to a standard installed in a rear doorway. Sighting consists of aligning the cross hair, a marker on the helicopter skid, and the drop zone. It can be adjusted for various drop conditions, weighs less than 10 pounds, and can be installed within 5 minutes. Dropsights have been evaluated and are being used for training by the US Army Intelligence Center/School at Fort Huachuca, AZ.
Author (GRA)

N75-10085# Office of the Director of Defense Research and Engineering, Washington, D.C.
T AND E GUIDELINES FOR AIRCRAFT SYSTEMS
2 Apr. 1974 62 p
(AD-784549) Avail: NTIS CSCL 01/3

A checklist for aircraft testing and evaluation is presented. Checklist items are used as guidelines for personnel activities during the conceptual phase, validation phase, full-scale engineering development phase, and the substantial production/deployment phase. The specilized aspects of individual subsystems performance tests are explained.
Author

N75-10371 European Space Research Organization, Paris (France).
DETERMINATION OF THE DYNAMIC CHARACTERISTICS OF A STRUCTURE FROM A VIBRATION TEST PERFORMED WITH ONLY ONE EXCITATION POINT
Rolland Dat *In its* Aerospace Res. (ESRO-TT-40) Apr. 1974 p 94-109 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel No. 1973-5, ONERA 1973, p 301-306 (For availability see N75-10367 01-34)

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N75-10086*# Illinois Univ., Urbana. Aeronautical and Astronautical Engineering.
STUDY OF THE FEASIBILITY OF USING A SAILPLANE AS AN INSTRUMENT PLATFORM FOR THE STUDY OF WAKE VORTEX PHENOMENA Final Report
Allen I. Ormsbee 5 Sep. 1974 4 p
(Grant NGR-44-005-206)
(NASA-CR-140603) Avail: NTIS HC $3.25 CSCL 01B

The feasibility of utilizing instrumentation mounted on a sailplane wing is investigated to determine vortex wakes from a large aircraft. The instrumentation consisted of static and total pressure tubes and a rotating vane vorticity meter mounted in a pod on the glider wing tip. It was concluded that the study was not feasible.
M.C.F.

N75-10775 Ministry of Defence, London (England).
THE IMPACT OF OPTO-ELECTRONICS UPON AVIONICS
F. S. Stringer *In* AGARD Opto-Electronics Sep. 1974 2 p
(For availability see N75-10774 01-74)

N75-10778 Hughes Aircraft Co., Culver City, Calif. Display Systems Lab.
DISPLAY DEVICES AND THEIR USE IN AVIONICS SYSTEMS
G. K. Slocum *In* AGARD Opto-Electronics Sep. 1974 14 p
(For availability see N75-10774 01-74)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

N75-10087*# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering.
EROSION IN RADIAL INFLOW TURBINES. VOLUME 3: TRAJECTORIES OF EROSIVE PARTICLES IN RADIAL INFLOW TURBINES Final Report
W. B. Clevenger, Jr. and W. Tabakoff Aug. 1974 126 p refs
(Grant NGR-36-004-055)
(NASA-CR-134700) Avail: NTIS HC $5.75 CSCL 21E

The theoretical trajectories that erosive particles follow in the gas flow fields of a typical radial inflow turbine were investigated. A discussion of the theoretical trajectories that the particles follow in the scroll, in the nozzles, in the vortex between the nozzles and the rotor, and in the rotor passages is included. The results are presented in terms of the characteristic length, a similarity parameter which relates the particles that follow the same trajectory in equivalent flow fields. For Vol. 1, see N74-19395.
Author

N75-10088*# New York Univ., N.Y. Aerospace and Energetics Lab.
FLUID DYNAMIC ASPECTS OF JET NOISE GENERATION Final Report, 1 Oct. 1973 - 30 Sep. 1974
30 Sep. 1974 110 p refs
(Grant NGR-33-016-177)
(NASA-CR-140673) Avail: NTIS HC $5.25 CSCL 20A

The location of the noise sources within jet flows, their relative importance to the overall radiated field, and the mechanisms by which noise generation occurs, are studied by detailed measurements of the level and spectral composition of the radiated sound in the far field. Directional microphones are used to isolate the contribution to the radiated sound of small regions of the flow, and for cross-correlation between the radiated acoustic field and either the velocity fluctuations or the pressure fluctuations in the source field. Acquired data demonstrate the supersonic convection of the acoustic field and the resulting limited upstream influence of the signal source, as well as a possible increase of signal strength as it propagates toward the centerline of the flow.
Author

N75-10089*# General Electric Co., Cincinnati, Ohio.
HIGHLY LOADED MULTI-STAGE FAN DRIVE TURBINE: PERFORMANCE OF FINAL THREE CONFIGURATIONS Final Report
D. G. Cherry and M. W. Thomas Washington NASA Sep. 1974 117 p refs
(Contract NAS3-14304)

(NASA-CR-2446; GE73AEG481) Avail: NTIS HC $5.25 CSCL 21E

Results for a three-stage highly loaded fan drive turbine follow-on test program are presented. The effects of combinations of tandem and leaned bladerows on three-stage turbine performance were tested. The three-stage turbine with a tandem stator in stage two exhibited a total-to-total efficiency of approximately 0.887 as compared to 0.886 for the plain blade turbine base case. Author

N75-10090# National Research Council of Canada, Ottawa (Ontario). Engine Lab.
SOME ICING TESTS ON SELECTED SCREEN SAMPLES
M. S. Chappell and W. Grabe Dec. 1972 24 p
(LTR-ENG-17) Avail: NTIS HC $3.25 CSCL 21E

A brief series of icing tests was conducted on wire mesh screens. The icing environments created in these tests were similar to those encountered at gas turbine ground installations. Both glaze and rime ice formed a strong lattice which was firmly attached to the upstream side of the screen wires. The ice did not shed, and runback ice was not observed on the downstream side of the screen was encountered. The recommended screen, a one-inch mesh of 1/8-inch wires, presented a good balance between a small increase in pressure loss from ice formations and adequate protection against hard ice buildups shed from plenum components above the engine intake. Author

N75-10091*# Boeing Commercial Airplane Co., Seattle, Wash.
SCALE MODEL TESTING OF THE JET NOISE CHARACTERISTICS OF THE JT8D REFAN ENGINE NOZZLE SYSTEM
D. H. Reed Mar. 1974 164 p
(Contract NAS3-17842)
(NASA-CR-134618; D6-41529) Avail: NTIS HC $6.25 CSCL 20A

The results are presented of static scale model acoustic tests of the nozzle system for the JT8D-9 baseline engine and candidate nozzle systems for JT8D-109, JT8D-115, and JT8D-117 refan engines. The objective of these tests was to determine the jet noise benefit of the three refan engine cycles relative to the baseline JT8D-9, and to provide acoustic information toward selection of the optimum primary-secondary area match and centerbody contour for the refan engine cycles. One of the nozzle configurations was tested with and without simulated turbine exit swirl to determine what effect, if any, swirl has no jet noise. The JT8D-109 cycle was found to afford approximately 9 db (OASPL) jet noise reduction relative to the JT8D-9 when compared on an equal static thrust basis. The JT8D-115 and JT8D-117 afford an 8 db and 6 db reduction, respectively, relative to the JT8D-9, at equal static thrust. Turbine exit swirl was found to have no significant effect on the jet noise of the JT8D-109 nozzle system. Author

N75-10092*# Ceramic Finishing Co., State College, Pa.
STRENGTHENING OF OXIDATION RESISTANT MATERIALS FOR GAS TURBINE APPLICATIONS
H. P. Kirchner Jun. 1974 99 p refs
(Contract NAS3-16788)
(NASA-CR-134661) Avail: NTIS HC $4.75 CSCL 21E

Silicon nitride and silicon carbide ceramics were treated to form compressive surface layers. On the silicon carbide, quenching and thermal exposure treatments were used, and on the silicon nitride, quenching, carburizing, and a combination of quenching and carburizing were used. In some cases substantial improvements in impact resistance and/or flexural strength were observed. The presence of compressive surface stresses was demonstrated by slotted rod tests. Author

N75-10093*# Stanford Research Inst., Menlo Park, Calif.
RELIABILITY OF LABORATORY TESTS OF VSTOL AND OTHER LONG DURATION NOISES Final Report
K. D. Kryter, D. J. Peeler, M. E. Dobbs, and J. S. Lukas Washington NASA Nov. 1974 44 p refs
(Contract NAS1-11602)
(NASA-CR-2471) Avail: NTIS HC $3.75 CSCL 20A

Paired-comparison and magnitude estimations of the subjective noisiness or unacceptability of noise from fixed wing jet aircraft and simulated noise of VSTOL aircraft were obtained from groups of subjects given different instructions. These results suggest that VSTOL noises can be evaluated in terms of their noisiness or unwantedness to people with reasonable accuracy by units of the physical measures designated as PNdBM, with or without tone corrections, and dBD sub 2. Also, that consideration should be given to the use of D sub 2 as an overall frequency weighting function for sound level meters instead of the presently available A weighting. Two new units of noise measurement, PLdB and dB(E), used for predicting subjective noisiness, were found to be less accurate than PNdBM or dBD sub 2 in this regard. Author

N75-10094*# General Electric Co., Schenectady, N.Y.
ISOLATED ROTOR NOISE DUE TO INLET DISTORTION OR TURBULENCE Final Report
Ramani Mani Washington NASA Oct. 1974 46 p refs
(Contract NAS3-17853)
(NASA-CR-2479) Avail: NTIS HC $3.75 CSCL 10C

Theoretical formulation, analysis, and results are presented that are necessary to analyze quadrupole noise generated from a loaded, subsonic rotor because of its interaction with an inflow distortion or inlet turbulence. The ratio of quadrupole to dipole noise is largely a function of the axial Mach number, wheel tip Mach number, rotor solidity, and total pressure ratio across the rotor. It is relatively independent of the specific form of the inflow distortion or inlet turbulence. Comparisons with experimental data only succeed in predicting gross levels at a given speed and fail to predict the variation of noise at fixed speed with flow and pressure ratio. Likely sources of this discrepancy are discussed. Author

N75-10095*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
REAL-TIME SIMULATION OF THE TF30-P-3 TURBOFAN ENGINE USING A HYBRID COMPUTER
John R. Szuch and William M. Bruton Washington Oct. 1974 104 p refs
(NASA-TM-X-3106; E-7904) Avail: NTIS HC $5.25 CSCL 21E

A real-time, hybrid-computer simulation of the TF30-P-3 turbofan engine was developed. The simulation was primarily analog in nature but used the digital portion of the hybrid computer to perform bivariate function generation associated with the performance of the engine's rotating components. FORTRAN listings and analog patching diagrams are provided. The hybrid simulation was controlled by a digital computer programmed to simulate the engine's standard hydromechanical control. Both steady-state and dynamic data obtained from the digitally controlled engine simulation are presented. Hybrid simulation data are compared with data obtained from a digital simulation provided by the engine manufacturer. The comparisons indicate that the real-time hybrid simulation adequately matches the baseline digital simulation. Author

N75-10096# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STATEMENT OF THE TWO-DIMENSIONAL NONSTATIONARY PROBLEM OF THERMAL CONDUCTIVITY FOR A BLADED WHEEL OF A GAS TURBINE
E. E. Denison and V. S. Petrovskii 29 Jul. 1974 17 p refs Transl. into ENGLISH from Inzh.-Fiz. Zh. (BSSR), v. 21, no. 2, Aug. 1971 p 257-264
(AD-784709; FTD-HT-23-725-74) Avail: NTIS CSCL 21/5

The system of differential equations of nonstationary thermal conductivity for a cooled wheel of a gas turbine equipped with shrouded blades on the stem is derived. GRA

N75-10097# Boeing Vertol Co., Philadelphia, Pa.
HLH/ATC ENGINE SHAFT SUPPORT BEARING DEVELOPMENT PROGRAM Final Test Results and Technology Development Reports
J. W. Lenski, Jr. May 1974 122 p Sponsored in part by Army Aviation Systems Command
(Contract DAAJ01-71-C-0840)
(AD-784593; T301-10237-1; USAAMRDL-TR-74-16) Avail: NTIS CSCL 01/3

Drive shafting which transmits power between combining transmission and engines is supported by ball bearings to structure. Because of the difficulty of providing fluid lubrication to these

bearings, they have always been lubricated with grease. Present experience with the CH-46 and CH-47 helicopters has shown that these bearings will perform adequately with grease lubrication at DN operating speeds of 450,000. The HLH drive system will use a similar bearing configuration to support both the synchronizing shafts and the engine shafts. Because of the increased speed requirements for a grease-lubricated ball bearing, a test program was conducted to determine the operating characteristics, design modifications and maximum regreasing interval for a ball bearing operating at the maximum loads and speed of the HLH engine and synchronizing shaft support bearing. (Modified author abstract) GRA

N75-10098*# General Motors Corp., Indianapolis, Ind. Detroit Diesel Allison Div.
IMMINENT ENGINE FAILURE PROBE INVESTIGATION Final Report, 1 Nov. 1972 - 30 Apr. 1974
Gail E. Hill Apr. 1974 118 p refs
(Contract F33615-73-C-2036; AF Proj. 3006)
(AD-783823; DDA-EDR-8134; AFAPL-TR-74-30) Avail: NTIS CSCL 21/5

The testing conducted and reported herein was an 18 month experimental program to determine the worth of an electrostatic probe and associated electronics as an indicator of engine health. The program consisted of laboratory tests, gas turbine engine probe location tests, particle injection tests, probe signature determination, development of data recording techniques, accumulation of data during durability testing of T56 or TF41 engines and any other opportunistic gas turbine engine test. The electrostatic probe demonstrated some capability to detect engine distress in TF41 and T56 engines; however, this program did not develop a reliable satisfactory engine failure detector system. Additional effort will be necessary to assure this.
Author (GRA)

N75-10099# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SOLUTIONS TO THE DIRECT PROBLEM OF HEAT TRANSFER BETWEEN A COOLED TURBINE BLADE AND GAS USING THE DISPERSION METHOD
A. M. Topunov, R. D. Iosifov, and N. G. Rodionov 24 Jul. 1974 12 p refs Transl. into ENGLISH from Inzh.-Fiz. Zh. (USSR), v. 21, no. 3, Sep. 1971 p 531-536
(AD-783927; FTD-HT-23-726-74) Avail: NTIS CSCL 21/5

The dispersion method is used to solve a differential equation of the third order describing heat exchange between gas and a cooled turbine blade. GRA

N75-10100# Pratt and Whitney Aircraft, West Palm Beach, Fla. Research and Development Center.
SHROUDED IMPELLER TEST PROGRAM Final Report
William J. McAnally, III and Jimmy D. Goodrum Jul. 1974 82 p
(Contract DAAJ02-74-C-0001; DA Proj. 1G1-62207-AA-71)
(AD-784133; PWA-FR-6328; USAAMRDL-TR-74-46) Avail: NTIS CSCL 21/5

The objectives of the program were to demonstrate the feasibility of using a shrouded impeller in a high-pressure-ratio centrifugal compressor, to determine the performance of the shrouded impeller, and to compare this performance to that of a similar 10:1 pressure ratio conventional open-face impeller previously tested. Results are discussed and indications are made for further development. (Modified author abstract) GRA

N75-10488 Societe Nationale d'Etude et de Construction de Moteurs d'Aviation, Corbeil (France).
PROBLEMS OF LOW CYCLE HIGH TEMPERATURE FATIGUE IN AIRCRAFT JET ENGINES
R. Brunetaud and J. Thiery *In* AGARD Low Cycle High Temp. Fatigue Aug. 1974 11 p In FRENCH; ENGLISH summary
(For availability see N75-10487 01-39)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N75-10101*# Intermetrics, Inc., Cambridge, Mass.
HAL/S LANGUAGE SPECIFICATION
Philip Newbold 15 Jun. 1974 281 p ref
(Contract NAS9-13864)
(NASA-CR-140279; IR-61-4) Avail: NTIS HC $17.25 CSCL 09B

A programming language for the flight software of the NASA space shuttle program was developed and identified as HAL/S. The language is intended to satisfy virtually all of the flight software requirements of the space shuttle. The language incorporates a wide range of features, including applications-oriented data types and organizations, real time control mechanisms, and constructs for systems programming tasks. Author

N75-10102*# Intermetrics, Inc., Cambridge, Mass.
HAL/S-360 USER'S MANUAL
Ron Kole 15 Jul. 1974 197 p
(Contract NAS9-13864)
(NASA-CR-140255; IR-58-6) Avail: NTIS HC $13.00 CSCL 09B

A manual to provide the information needed by programmers to compile and execute a HAL/S program is presented. It also provides a detailed discussion of the printed matter that will be produced as a result of the compilation and execution of a HAL/S program. This manual is not intended as a guide to the HAL/S language. It is a reference document to be used in the process of getting HAL/S programs compiled and debugged on the IBM/360. A knowledge of the HAL/S language syntax and programming techniques is presumed in some of the discussions. The succeeding sections of this document present a system guide for all phases in the development of a successful HAL program. Topics range from operating system communication to interpretation of debugging aids. A final section presents features of the HAL programming system that have specific System/360 dependencies. Author

N75-10103# European Space Research Organization, Paris (France).
OPTIMUM TRANSIENT RESPONSE CHARACTERISTIC OF A VTOL AIRCRAFT WITH DIRECT SIDE FORCE CONTROL
Ruthard Koehler, K. Wilhelm et al May 1974 83 p refs Transl. into ENGLISH of Ueber regelungstech. Eigenschaften eines VTOL-Flugzeugs mit direkter Seitenkraftsteuerung, DLR-FB-73-72, DFVLR, 22 May 1973
(DLR-FB-73-72; ESRO-TT-79) Avail: NTIS HC $4.75; DFVLR, Porz, West Ger. 18.50 DM

VTOL aircraft with low roll control power are criticized by pilots as sluggish. After attaining the direction of approach the correlation of lateral deviations and side wind forces cannot be performed satisfactorily. Jet deflections generating side forces improve control characteristics. The optimization of some controllers and their applicability are discussed. Author (ESRO)

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N75-10104*# Grumman Aerospace Corp., Bethpage, N.Y.
DEVELOPMENT OF AN APPARATUS TO MEASURE THERMOPHYSICAL PROPERTIES OF WIND TUNNEL HEAT TRANSFER MODELS Final Report
Richard F. Romanowski and Ira H. Steinberg Washington NASA

Sep. 1974 144 p refs
(Contract NAS1-11537)
(NASA-CR-2434) Avail: NTIS HC $5.75 CSCL 14B

The apparatus and technique for measuring the thermophysical properties of models used with the phase-change paint method for obtaining wind tunnel heat transfer data are described. The method allows rapid measurement of the combined properties in a transient manner similar to an actual wind tunnel test. An effective value of the thermophysical properties can be determined which accounts for changes in thermal properties with temperature or with depth into the model surface. The apparatus was successfully tested at various heating rates between 19,000 and 124,000 watts per square meter. Author

N75-10105*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
STATION SET REQUIREMENTS DOCUMENT. VOLUME 82: FIRE SUPPORT. BOOK 2: PRELIMINARY FUNCTIONAL FIRE PLAN
N. C. Gray 3 Aug. 1974 62 p
(NASA-TM-X-72032; K-SM-10.1.21) Avail: NTIS HC $4.25 CSCL 14B

The fire prevention/protection requirements for all shuttle facility and ground support equipment are presented for the hazardous operations. These include: preparing the orbiter for launch, launch operations, landing operations, safing operations, and associated off-line activities. F.O.S.

N75-10106*# Wyle Labs., Inc., Hampton, Va. Scientific Services and Systems Group.
NASA-LANGLEY HELICOPTER TOWER INSTRUMENTATION SYSTEMS
S. W. Stoffel Oct. 1974 118 p
(Contract NAS1-12841)
(NASA-CR-132522; Rept-50601) Avail: NTIS HC $5.25 CSCL 14B

Background information is presented for the helicopter rotor test facility, in preface to a more detailed discussion of major subsystems equipment, including error considerations, frequency response, and display instrumentation. A.A.D.

N75-10107# National Research Council of Canada, Ottawa (Ontario). Gas Dynamics Lab.
EXPERIENCE WITH THE NRC 10 FEET BY 20 FEET V/STOL PROPULSION TUNNEL: SOME PRACTICAL ASPECTS OF V/STOL ENGINE MODEL TESTING
R. A. Tyler and R. G. Williamson Jul. 1973 32 p refs Reprinted
(DME/NAE-1973(2)) Avail: NTIS HC $3.75

Experience in the operation and use of the NRC 10 ft. x 20 ft V/STOL propulsion tunnel is reviewed. This research facility, designed specifically for the investigation of problems relating to V/STOL engine systems, was first operated in December 1962. Representative experimental programs carried out in the tunnel since that time are used to illustrate general problem areas associated with the testing of highpowered models. Author

N75-10108*# Chrysler Corp., New Orleans, La.
AERODYNAMIC RESULTS OF SUPPORT SYSTEM INTERFERENCE EFFECTS TESTS CONDUCTED IN NASA/ARC 6 BY 6-FOOT SUPERSONIC WIND TUNNEL USING AN 0.015-SCALE MODEL OF THE CONFIGURATION 140A/B SSV ORBITER (OA59), VOLUME 1
John H. Campbell, II and Willard R. Embury Sep. 1974 683 p Prepared by Rockwell Intern. Corp., Downey, Calif.
(Contract NAS9-13247)
(NASA-CR-134410; DMS-DR-2159-Vol-1) Avail: NTIS HC $15.25 CSCL 14B

An experimental aerodynamic investigation was conducted in the NASA/ARC 6- by 6-foot supersonic wind tunnel on an 0.015-scale configuration 140A/B SSV Orbiter model. The primary objective was to determine the extent aerodynamic simulation is compromised by sting base mounting with MPS nozzles removed. Both a conventional sting (through the base) and an alternate model mounting system were utilized. The alternate mounting system consisted of a non-metric blade strut, which approximated the vertical tail and entered the model through the upper aft section of its fuselage. The model was tested both in and out of the presence of a dummy sting with and without MPS nozzles when on the alternate mounting system. Data were obtained at Mach numbers from 0.6 through 2.0, a Reynolds number of 2.5 million per foot, angles of attack from -4 through 14 degrees, angles of sideslip from -15 through 15 degrees, elevon deflections of 0 and 15 degrees, and bodyflap deflections of -11.7, 0, and 16.3 degrees. Author

N75-10109*# Chrysler Corp., New Orleans, La. Data Management Services.
AERODYNAMIC RESULTS OF SUPPORT SYSTEM INTERFERENCE EFFECTS TESTS CONDUCTED IN NASA/ARC 6 BY 6-FOOT SUPERSONIC WIND TUNNEL USING A 0.015 SCALE MODEL OF THE CONFIGURATION 140A/B SSV ORBITER, VOLUME 2
John H. Campbell, II (Rockwell International Corp.) and Willard R. Embury (Rockwell International Corp.) Sep. 1974 553 p (Contract NAS9-13247)
(NASA-CR-134412; DMS-DR-2159-Vol-2) Avail: NTIS HC $13.00 CSCL 14B

For abstract, see N75-10108.

N75-10110# Royal Aircraft Establishment, Farnborough (England).
HYBRID ELECTROHYDRAULIC STICK-FORCE SIMULATOR
F. Erdmann, R. Dierke, and E. Biertumpel Jun. 1974 47 p refs Transl. into ENGLISH from the German report DLR-FB-73-99
(RAE-Lib-Trans-1751; BR42406; DLR-FB-73-99) Avail: NTIS HC $3.75

The development of a mathematical model for the artificial presentation of control-column loads is described. The nonlinear model is realized by hybrid computing elements, an electric force-sensitive device and an electrohydraulic servosystem. The result of the investigation is a compact and flexible control force system. Damping, Coulomb-friction and column inertia are adjustable. The trim-point and the gradient are controllable by analogue and digital simulation processors. The midpoint can be marked by a notch or break-out force. Author

N75-10111# European Space Research Organization, Paris (France).
INVESTIGATION OF THE THERMAL LOAD OF ROOMS AS A RESULT OF SOLAR RADIATION THROUGH WINDOWS BY LABORATORY EXPERIMENTS USING SIMULATED GLOBAL RADIATION
Andreas Kalt Sep. 1974 77 p refs Transl. into ENGLISH of Ermittlung der Waermebelastung von Raeumen infolge Sonneneinstrahlung durch Fenster im Laborvers. unter Verwendung kuenstlich erzeugter Globalstrahlung, DLR-FB-73-73, DFVLR, 30 May 1973
(DLR-FB-73-73; ESRO-TT-92) Avail: NTIS HC $4.75; DFVLR, Porz, West Ger. 27.90 DM

Certain climatic tests which require solar and sky radiation were carried out in the laboratory by using simulated global radiation; the advantages of such a method of measurement and the possibilities and limitations resulting from the simulation of global radiation are described. Experiments concerning the thermal load in rooms, carried out in order to test the procedure, are described and the results are presented. The heat gain through a window with sunshade was tested using a venetian blind between the panes of a double-glazed window. Author (ESRO)

N75-10112# Illinois Univ., Savoy. Aviation Research Lab.
EFFECTS OF GROUND-BASED AIRCRAFT SIMULATOR MOTION CONDITIONS UPON PREDICTION OF PILOT PROFICIENCY, PART 1 Scientific Interim Report
Jefferson M. Koonce Apr. 1974 106 p refs
(Contract F44620-70-C-0105; AF Proj. 9778)
(AD-783256; ARL-74-5/AFOSR-74-3-Pt-1; AFOSR-74-1292TR-Pt-1) Avail: NTIS CSCL 05/9

Three groups of thirty pilots with multi-engine and instrument ratings performed a simulated flight mission in a General Aviation Trainer on each of two days. The experimental conditions for the groups differed in terms of GAT-2 motion: no motion; sustained linear, scaled-down analog motion; and washout motion. Each group of pilots then flew the same mission in a light

twin-engine aircraft representative of the class of aircraft simulated by the GAT-2. The results indicated that the proficiency of aircraft pilots can be predicted to a high degree from ground-based simulator performance measures. (Modified author abstract)
GRA

N75-10113# Texas Univ., Austin. Antennas and Propagation Lab.
A MICROWAVE MODEL OF THE INSTRUMENT LANDING SYSTEM
Arnold Frank Polak and Alfred H. LaGrone Dec. 1973 72 p refs
(PB-232747/6; UTX-A/P-73-55) Avail: NTIS HC $3.75 CSCL 17G

The paper reports on the construction and initial testing of a model airport landing system. Only the glide slope portion of the instrument landing system (ILS) was modelled. The ultra high frequency (UHF) of the ILS glide slope signal was translated to the microwave X-band. This gave a scale factor of approximately 30 to 1. Correspondingly, all physical features of the airport were reduced by this factor. The operating system was tested on a unobstructed smooth reflecting surface. The model provided a glide slope radiation pattern which agreed with the theoretical predicted pattern within 0.3 degree of elevation angle. Horizontal polarization was used. Author (GRA)

N75-10114# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
LAKE ERIE INTERNATIONAL JETPORT MODEL FEASIBILITY INVESTIGATION. REPORT 1: SCOPE OF STUDY AND REVIEW OF AVAILABLE DATA
Donald L. Durham and Douglas G. Outlaw Jul. 1947 72 p refs
(AD-783463; AEWES-TR-H-74-6-1) Avail: NTIS CSCL 08/8

This report presents the scope of the U. S. Army Engineer Waterways Experiment Station's (WES) investigation of the proposed Lake Erie International Jetport and summarizes the data obtained from the literature and private individuals. The objectives of the investigation, Part I, include a review of the literature concerning wave activity (wind waves, seiches, and tides) and mass circulation in Lake Erie, preliminary design of necessary hydraulic models, and preliminary application of analytical and/or numerical models to seiching and mass circulation. (Modified author abstract) GRA

N75-10115# Illinois Univ., Savoy. Aviation Research Lab.
EFFECTS OF GROUND BASED AIRCRAFT SIMULATOR MOTION CONDITIONS UPON PREDICTION OF PILOT PROFICIENCY, PART 2 Scientific Interim Report
Jefferson M. Koonce Apr. 1974 113 p refs
(Contract F44620-70-C-0105; AF Proj. 9778)
(AD-783257; ARL-74-5/AFOSR-74-3-Pt-2; AFOSR-74-1292TR-Pt-2) Avail: NTIS CSCL 05/9

The second volume in a two volume report describes experiments leading to the development of improved methods of evaluating pilot proficiency both in training and the certification process. The experiment requires a large number of multi-engine instrument rated pilots to serve as experimental subjects. GRA

N75-10116# Ballistic Research Labs., Aberdeen Proving Ground, Md.
VAPOR SCREEN TECHNIQUES DEVELOPMENT AT THE BALLISTIC RESEARCH LABORATORIES Final Report
Charles J. Nietubicz Jun. 1974 32 p
(DA Proj. 1T3-62301-A-201)
(AD-784077; BRL-MR-2387) Avail: NTIS CSCL 20/4

Results of the vapor screen technique development in the Ballistic Research Laboratories Supersonic Wind Tunnel No. 1 are presented. A standard light source in conjunction with a schlieren mirror system are compared photographically with the results of using a laser light source. The amount of condensation required, photographic equipment and testing procedure are presented. Vapor screen pictures of main body vortices, photographed through a downstream prism as well as through the tunnel access window are shown. A unique photograph showing a set of vortices being generated prior to separation is presented. The wind tunnel tests were conducted at Mach number 2.25. Author (GRA)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N75-10117*# Lockheed Missiles and Space Co., Huntsville, Ala.
PHYSICAL FORCES INFLUENCING SKYLAB EXPERIMENTS M551, M552, AND M553 Summary Report
S. V. Bourgeois Jan. 1974 77 p refs
(Contract NAS8-27015)
(NASA-CR-129037; TR-D390056) Avail: NTIS HC $4.75 CSCL 22C

The forces concerned with metals melting, exothermic brazing, and sphere forming experiments on Skylab 1 mission are reported. The conclusions reached are that no significant practical differences exist between terrestrial and microgravity electron beam melting, and braze gap clearances are far less critical to joining operations in space than on earth. Altered microstructures, increased grain refinement, and the appearance of a single, large interior shrinkage pore were found in the Skylab specimens.
F.O.S.

N75-10118*# Battelle Columbus Labs., Ohio.
CHARACTERIZATION OF METALS MELTING DISCS SKYLAB EXPERIMENT M551
Robert E. Monroe Jan. 1974 120 p
(Contract NAS8-28725)
(NASA-CR-129041) Avail: NTIS HC $5.25 CSCL 13H

Characterizations of flight and ground based samples from the metals melting experiment are detailed. The characteristics were determined by nondestructive investigation, visual observation, metallographic examination, and post-test measurements. Comparisons of the flight and ground based discs showed that an electron beam heat source can be used in zero gravity for cutting, welding, or melting. Author

N75-10119*# Grumman Aerospace Corp., Bethpage, N.Y.
RESEARCH STUDY ON MATERIALS PROCESSING IN SPACE EXPERIMENT NUMBER M512: NICKEL - 12 wt PERCENT TIN ALLOY EVALUATION Summary Report
David J. Larson, Jr. and H. Li Chou 11 Nov. 1974 19 p
(Contract NAS8-28728)
(NASA-CR-129038) Avail: NTIS HC $3.25 CSCL 22B

Nickel-tin (12 wt percent tin) samples were processed in the sphere forming experiment on Skylab 2. The results were characterized for sphericity, density, microhardness, porosity, surface morphology, segregation, chemical composition, Curie point, and crystallography. These results are discussed along with conclusions and recommendations. Author

N75-10120*# Lockheed Missiles and Space Co., Huntsville, Ala. Research and Engineering Center.
CONVECTION EFFECTS ON SKYLAB EXPERIMENTS M551, M552, AND M553, PHASE C REPORT
S. V. Bourgeois Dec. 1973 96 p refs
(Contract NAS8-27015)
(NASA-CR-120482) Avail: NTIS HC $4.75 CSCL 22C

This report described an analysis of Skylab Experiments M551 (Metals Melting), M552 (Exothermic Brazing), and M553 (Sphere Forming). The primary objective is the study of convection in the molten metals and their attendant solidification theory. Particular attention is given to clarifying the effects of reduced gravity on molten metal flow and solidification. Based on an analysis of physical forces and solidification theory expected for ground-based and Skylab processing, low-g variations were predicted for each experiment. A comparison was then made with the Skylab results available to date. Both metallurgical analyses of other investigators and movies of ground-based and Skylab samples were utilized. Several low-g variations in Skylab processed materials were successfully predicted based on expected variations in physical forces and fluid convection. The same analysis also successfully predicted several features in the

Skylab-processed materials which were identical to terrestrially-processed materials. These results are summarized in the conclusion section for each experiment. Author

N75-10121*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MSFC SKYLAB COROLLARY EXPERIMENT SYSTEMS MISSION EVALUATION
Sep. 1974 426 p refs
(NASA-TM-X-64820) Avail: NTIS HC $11.25 CSCL 22C

Evaluations are presented of the performances of corollary experiment hardware developed by the George C. Marshall Space Flight Center and operated during the three manned Skylab missions. Also presented are assessments of the functional adequacy of the experiment hardware and its supporting systems, and indications are given as to the degrees by which experiment constraints and interfaces were met. It is shown that most of the corollary experiment hardware performed satisfactorily and within design specifications. Author

N75-10122*# Teledyne Brown Engineering, Huntsville, Ala. Research Labs.
LIQUID PHASE SINTERED COMPACTS IN SPACE Final Report
T. K. Mookherji and W. B. McAnelly Sep. 1974 72 p refs
(Contract NAS8-29951)
(NASA-CR-120507; EE-ASTN-1827) Avail: NTIS HC $4.25 CSCL 13H

A model that will explain the effect of gravity on liquid phase sintering was developed. Wetting characteristics and density segregation which are the two important phenomena in liquid phase sintering are considered in the model development. Experiments were conducted on some selected material combinations to study the gravity effects on liquid phase sintering, and to verify the validity of the model. It is concluded that: (1) The surface tension forces acting on solid particles in a one-g environment are not appreciably different from those anticipated in a 0.00001g/g sub 0 (or lower) environment. (2) The capillary forces are dependent on the contact angle, the quantity of the liquid phase, and the distance between solid particles. (3) The pores (i.e., bubbles) do not appear to be driven to the surface by gravity-produced buoyancy forces. (4) The length of time to produce the same degree of settling in a low-gravity environment will be increased significantly. (5) A low gravity environment would appear to offer a unique means of satisfactorily infiltrating a larger and/or complex shaped compact. Author

N75-10123*# National Aeronautics and Space Administration, Washington, D.C.
PIONEER 11 JUPITER ENCOUNTER
19 Nov. 1974 70 p
(NASA-News-Release-74-292) Avail: NASA Scientific and Technical Information Facility, P. O. Box 33, College Park, Md. 20740 CSCL 22C

Pioneer 11, man's second spacecraft to Jupiter, is discussed. A description of the mission is given along with its projected outcome. Radiation hazards are also discussed. M.C.F.

N75-10124*# National Aeronautics and Space Administration, Washington, D.C.
SKYNET 2-B/DELTA 105
[1974] 7 p
(NASA-News-Release-74-303) Avail: NASA Scientific and Technical Information Facility, P. O. Box 33, College Park, Md. 20740 CSCL 22A

A British defense communications satellite is discussed for launch into synchronous orbit over the Indian Ocean aboard a NASA Delta three-stage launch vehicle from Cape Canaveral. Author

N75-10125*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INTERPLANETARY SPACE-A NEW LABORATORY FOR RAREFIED GAS DYNAMICS
John R. Spreiter (Stanford Univ., Calif.) and Arthur R. Rizzi [1974] 25 p refs
(Grant NGR-05-020-330; NSF GA-37691)
(NASA-TM-X-72050) Avail: NTIS HC $3.25 CSCL 22C

Interplanetary space provides simultaneously the best vacuum available to man and, because of the solar wind, a tenuous and unsteady high-speed outflow of predominantly hydrogen gas from the sun, a remarkable variety of rarefied gasdynamics phenomena, to observe. A review is provided of these phenomena, and of the way in which the present level of understanding has been achieved. Author

N75-10126*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
RETENTION AND APPLICATION OF SKYLAB EXPERIENCES TO FUTURE PROGRAMS
V. G. Gillespie and R. O. Kelly Aug. 1974 142 p
(NASA-TM-X-64853) Avail: NTIS HC $5.75 CSCL 22C

The problems encountered and special techniques and procedures developed on the Skylab program are described along with the experiences and practical benefits obtained for dissemination and use on future programs. Three major topics are discussed: electrical problems, mechanical problems, and special techniques. Special techniques and procedures are identified that were either developed or refined during the Skylab program. These techniques and procedures came from all manufacturing and test phases of the Skylab program and include both flight and GSE items from component level to sophisticated spaceflight systems. Author

N75-10127*# International Business Machines Corp., Philadelphia, Pa. Scientific Center.
THREE MODELS FOR SCHEDULING SPACE SHUTTLE MISSIONS AND RESOURCES Final Report
Jerrold Rubin 4 Sep. 1974 34 p
(Contract NAS9-13939)
(NASA-CR-140319) Avail: NTIS HC $3.75 CSCL 22A

The scheduling of space shuttle missions within specified window and resource constraints are reported. Models are described for selecting qualified resource units to the mission assignments. M.C.F.

N75-10128*# Johns Hopkins Univ., Baltimore, Md. Dept. of Physics.
APOLLO 17 ULTRAVIOLET SPECTROMETER EXPERIMENT (S-169) Final Report
Wm. G. Fastie 30 Jul. 1974 127 p refs Original contains color illustrations
(Contract NAS9-11528)
(NASA-CR-140316) Avail: NTIS HC $5.75 CSCL 22C

The scientific objectives of the ultraviolet spectrometer experiment are discussed, along with design and operational details, instrument preparation and performance, and scientific results. Information gained from the experiment is given concerning the lunar atmosphere and albedo, zodiacal light, astronomical observations, spacecraft environment, and the distribution of atomic hydrogen in the solar system and in the earth's atmosphere. A.A.D.

N75-10129*# Library of Congress, Washington, D.C. Science and Technology Div.
ASTRONAUTICS AND AERONAUTICS, 1972
NASA 1974 590 p refs Sponsored by NASA
(NASA-SP-4017; LC-65-60308) Avail: NTIS MF $2.25; SOD HC $4.85 CSCL 22A

Important events of the U. S. space program during 1972 are recorded in a chronology which encompasses all NASA, NASA related, and international cooperative efforts in aeronautics and astronautics. Personnel and budget concerns are documented, along with the major developments in aircraft research, manned space flight, and interplanetary exploration. A.A.D.

N75-10130*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PIONEER ODYSSEY: ENCOUNTER WITH A GIANT
Richard O. Fimmel, William Swindell, and Eric Burgess Washington 1974 183 p refs Original contains color illustrations
(NASA-SP-349; LC-74-600117) Avail: NTIS MF $2.25; SOD HC $5.50 CSCL 22C

Jupiter, as revealed by Pioneer 10, is described along with the mission and spacecraft. Photographs of the encounter with Jupiter are presented. F.O.S.

N75-10131*# National Aeronautics and Space Administration, Washington, D.C.
INTELSAT 4
14 Nov. 1974 10 p
(NASA-News-Release-74-305) Avail: NASA Scientific and Technical Information Facility, P. O. Box 33, College Park, Md. 20740 CSCL 22A

A news release on the launching of Intelsat 4 commercial communication satellite is presented. This satellite will be positioned on the equator over the Pacific Ocean. The Atlas-Centaur launch vehicle is considered, along with the launch windows. J.A.M.

N75-10132# Deutsches Geodaetisches Forschungsinstitut, Munich (West Germany).
OBSERVATION EQUATIONS FOR RESONANCE PARAMETERS OF THE 13TH ORDER FROM THE ORBIT ANALYSIS OF GEOS B, BE-C, AND D1D SATELLITES [BESTIMMUNGSGLEICHUNGEN FUER RESONANZPARAMETER DER ORDNUNG 13 AUS DER ANALYSE VON BAHNEN DER SATELLITEN GEOS B, BEC UND D1D]
Christoph Reigber Bayerische Akad. der Wiss. 1974 121 p refs In GERMAN; ENGLISH summary
(Ser-c/Diss-198) Avail: NTIS HC $5.25

With the aid of optical and laser data for a total of 8 arcs of the GEOS B (680021)-, BE-C (650321)- and D1D (670141)-satellites, 110 observation equations for the 13th order resonant harmonics were derived by analyzing the resonance effect in the mean longitude, the inclination, and the eccentricity. The 110 equations were solved for a preliminary 10 coefficients-solution up to the (18.13)-terms. The solution is clearly influenced by neglected harmonics. The solution derived gives, compared with the SAO- and GSFC-13th order coefficients, an equivalently sufficient fit to the GEOS B- and BE-C-amplitudes and an improved, but not sufficient, fit to the D1D-amplitudes. Author (ESRO)

N75-10133# Hawker Siddeley Dynamics, Ltd., Hatfield (England). Space Div.
ESRO NIMRA CONVERSION STUDY Final Report
G. W. Cocks, comp. Jun. 1974 250 p refs
(HSD-TP-7472; ESRO-CR(P)-526) Avail: NTIS HC $7.50

A study is presented in which two different IR radiometer experiments were redesigned to take advantage of the relaxations offered by Spacelab (NIMRA). The experiments, part of an atmospheric investigation program, are: Nimbus F, a two-channel radiometer to investigate CO2 distribution in the upper atmosphere; and Nimbus G, a ten-channel radiometer investigating the distribution of a number of gases in the upper atmosphere. The scientific objectives and engineering requirements of the spacecraft experiments were examined, and the potential of Spacelab is evaluated in this respect. The redesign of the experiments for use on Spacelab is discussed, and costs are compared with the spacecraft versions. An experimental model philosophy is established and the impact thereof on program and costs investigated. ESRO

N75-10134# Technisch Physisch Dienst TNO-TH, Delft (Netherlands).
EXPERIMENT S-59 CONVERSION
A. Hammerschlag 14 Jun. 1974 183 p refs
(Contract ESRO-SC/20/73-HQ)
(Rept-311.271; ESRO-CR(P)-527) Avail: NTIS HC $7.00

The possibility of using Spacelab for an ultraviolet stellar spectrophotometry experiment was investigated. In particular, the performing of experiments onboard Spacelab was reviewed with regard to the following points: the quality of the results achieved, the design of the experiments, development time of the experiments, and development and operating costs for the experimenter. The main advantage of Spacelab is the capability to modify the instrumentation and observing program at short notice, and, to some extent, even in-flight according to current scientific needs and taking into account the latest results obtained. ESRO

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

No abstracts in this category.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

N75-10135*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
TECHNOLOGY EVALUATION OF HEATING, VENTILATION, AND AIR CONDITIONING FOR MIUS APPLICATION
William L. Gill, Martin B. Keough, and James O. Rippey Nov. 1974 63 p refs
(NASA-TM-X-58128; JSC-08571) Avail: NTIS HC $4.25 CSCL 14B

Potential ways of providing heating, ventilation, and air conditioning for a building complex serviced by a modular integrated utility system (MIUS) are examined. Literature surveys were conducted to investigate both conventional and unusual systems to serve this purpose. The advantages and disadvantages of the systems most compatible with MIUS are discussed. Author

N75-10136*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PERFORMANCE MONITOR SYSTEM FUNCTIONAL SIMULATOR, ENVIRONMENTAL DATA, ORBITER 101(HFT)
F. W. Parker (Lockheed Electronics Co., Inc.) 11 Nov. 1974 255 p refs
(NASA-TM-X-72028; LEC-3093; JSC-09052) Avail: NTIS HC $8.50 CSCL 14B

Information concerning the environment component of the space shuttle performance monitor system simulator (PMSS) and those subsystems operational on the shuttle orbiter 101 used for horizontal flight test (HFT) is provided, along with detailed data for the shuttle performance monitor system (PMS) whose software requirements evolve from three basic PMS functions: (1) fault detection and annunciation; (2) subsystem measurement management; and (3) subsystem configuration management. Information relative to the design and operation of Orbiter systems for HFT is also presented, and the functional paths are identified to the lowest level at which the crew can control the system functions. Measurement requirements are given which are necessary to adequately monitor the health status of the system. PMS process requirements, relative to the measurements which are necessary for fault detection and annunciation of a failed functional path, consist of measurement characteristics, tolerance limits, precondition tests, and correlation measurements. Author

N75-10014 European Space Research Organization, Paris (France).
RECENT IMPROVEMENTS IN THE LIGHT ELEMENT MICROANALYSER
Francoise Pichoir *In its* Aerospace Res. (ESRO-TT-90) Sep. 1974 p 54-67 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel No. 1973-4, 1973, p 225-231 (For availability see N75-10011 01-02)

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N75-10137*# National Aeronautics and Space Administration, Washington, D.C.
SPACELAB PROGRAM REQUIREMENTS, LEVEL 1
26 Sep. 1974 27 p
(NASA-TM-X-72031; NASA-MF-74-1; ESRO-SL-74-1) Avail: NTIS HC $3.75 CSCL 22A

The design and development of Spacelab is reported including the ground support equipment, facilities, and operational planning. The shuttle interface, and user requirements are discussed along with product assurance and safety. F.O.S.

N75-10138*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MSFC SKYLAB MISSION REPORT: SATURN WORKSHOP
Oct. 1974 432 p refs
(NASA-TM-X-64814) Avail: NTIS HC $11.25 CSCL 22C

The Skylab's Saturn Workshop mission performance is presented. Experiments were conducted to determine man's ability to live and work in space for extended periods, to make sun and earth investigations, and to advance science and technology in several areas of space applications. Performance is compared with design parameters, and problem causes and solutions are treated. The Saturn Workshop successfully performed its role and advanced the technology of space systems design. Author

N75-10139*# New Hampshire Univ., Durham. Dept. of Physics.
DATA ANALYSIS SUPPORT FOR UNH GAMMA RAY DETECTOR ON OSO-7 Progress Report, 1 Jan. - 31 Aug. 1974
E. L. Chupp 29 Oct. 1974 31 p refs
(Grant NGR-30-002-104)
(NASA-CR-140597) Avail: NTIS HC $3.75 CSCL 22C

The data is reviewed from the gamma ray experiment on OSO-7. Analysis of the data, and information on the data processing are described. Author

N75-10140*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SATURN 1B LAUNCH VEHICLE FLIGHT EVALUATION REPORT SA-208 (SKYLAB-4)
31 Jan. 1974 250 p
(NASA-TM-X-72019; MPR-SAT-FE-74-1) Avail: NTIS HC $7.50 CSCL 22C

The results of the Saturn 1B, SA-208 launch vehicle flight evaluation are presented. The performance of the launch vehicle is analyzed with special emphasis given to indentifying the causes of flight problems. Recommendations for corrective action and summaries of launch operations and spacecraft performance are included. N.R.

N75-10141*# National Aeronautics and Space Administration, Washington, D.C.
MISSION OPERATION REPORT: APPLICATIONS TECHNOLOGY SATELLITE (ATS-F)
24 May 1974 118 p
(NASA-TM-X-72530; E-630-74-06) Avail: NTIS HC $5.25 CSCL 22B

NASA-stated mission objectives for the ATS-F spacecraft are: (1) to inject the vehicle into a near geostationary orbit; (2) to erect a large antenna structure in orbit which, with its associated communication system, is capable of providing a good quality TV signal to small, inexpensive ground receivers; (3) to stabilize the spacecraft using a three-axis control system with a slewing capability in roll and pitch which permits the antenna to be pointed with an accuracy commensurate with the antenna characteristics; and (4) to support and demonstrate user oriented applications experiments utilizing the spacecraft capabilities. Program development for ATS-F flight is summarized, and descriptions are given of mission plans, experiment design, and spacecraft and launch vehicle configurations. The sequence of flight events is given, and detailed information on mission support, mission management responsibility, and project costs are provided. A.A.D.

N75-10142*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TRAJECTORY SELECTION FOR THE MARINER JUPITER/SATURN 1977 PROJECT
James S. Dyer and Ralph F. Miles, Jr. 15 Oct. 1974 49 p refs
(Contract NAS7-100)
(NASA-CR-140704; JPL-TM-33-706) Avail: NTIS HC $3.75 CSCL 22C

The use of decision analysis to facilitate a group decision-making problem in the selection of trajectories for the two spacecraft of the Mariner Jupiter/Saturn 1977 Project. A set of 32 candidate trajectory pairs was developed. Cardinal utility function values were assigned to the trajectory pairs, and the data and statistics derived from collective choice rules were used in selecting the science-preferred trajectory pair. Author

N75-10143*# Applied Science Associates, Inc., Apex, N.C.
ENGINEERING STUDIES RELATED TO THE SKYLAB PROGRAM Final Report
G. S. Hayne Sep. 1974 105 p
(Contract NAS6-2307)
(NASA-CR-137473) Avail: NTIS HC $5.25 CSCL 22C

The problem of analysis and interpretation of the waveform related data from the radar altimeter experiment is presented. The computer programs developed or modified for the realignment processes are briefly discussed. M.C.F.

N75-10144# Max-Planck-Institut fuer Physik und Astrophysik, Munich (West Germany). Inst. fuer Extraterrestrische Physik.
PROPOSAL FOR AN EXPERIMENT FOR THE ESRO GEOSTATIONARY MAGNETOSPHERIC SATELLITE
1 Apr. 1972 21 p
Avail: NTIS HC $3.25

An experiment for the continuous measurement of the component perpendicular to the geomagnetic field of the dc electric field as seen by the ESRO geostationary magnetispheric satellite is proposed. The scientific aims and significance are outlined and the experimental setup is considered. Technical characteristics include thermal control, power supply, telemetry, telecommand, tracking, the attitude measurement, subsystem, spacecraft cleanliness, and reliability. Final data processing and the normal data processing operating mode are discussed. ESRO

N75-10145# Royal Aircraft Establishment, Farnborough (England).
SATELLITE X4: THE 100-ELEMENT SELF-SCANNED PHOTODIODE ARRAY EXPERIMENT
A. K. Brookman and M. J. Pearson Mar. 1974 65 p refs
(RAE-TR-73195; BR40237) Avail: NTIS HC $4.25

The 100-element self-scanned photodiode array experiment installed in the X4 satellite is described. Array development, testing, and quality assurance procedures are described, and current performance is summarized. Problems which have arisen, notably encapsulation techniques and fixed pattern noise, are discussed. Author (ESRO)

N75-10146# European Space Research Organization, Paris (France).
ORBIT DETERMINATION FOR DEEP SPACE MISSIONS BY MEANS OF DOPPLER AND RANGING
Philip Hartl Jun. 1974 132 p refs Transl. into ENGLISH of Die Bedeuting der Doppler- U. Laufzeitmessung fuer erdferne Raumfahart-Missionen, DLR-FB-73-104, DFVLR, 30 Aug. 1973 (ESRO-TT-80; DLR-FB-73-104) Avail: NTIS HC $5.75, DFVLR, Porz, West Ger. 43.70 DM

Orbit determination for deep space probes is discussed from a systems-theoretical point of view. Mainly Doppler and ranging methods are dealt with. Many important aspects for accurate orbit determination are reviewed. ESRO

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

No abstracts in this category.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N75-10147*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

FLIGHT TESTS OF VIKING PARACHUTE SYSTEM IN THREE MACH NUMBER REGIMES. 1: VEHICLE DESCRIPTION, TEST OPERATIONS, AND PERFORMANCE

Reginald R. Lundstrom, James L. Raper, Richard J. Bendura, and E. William Shields (LTV Aerospace Corp., Hampton, Va.) Washington Oct. 1974 162 p refs

(NASA-TN-D-7692; L-9536) Avail: NTIS HC $6.25 CSCL 22B

Flight qualifications for parachutes were tested on full-scale simulated Viking spacecraft at entry conditions for the Viking 1975 mission to Mars. The vehicle was carried to an altitude of 36.6 km for the supersonic and transonic tests by a 980,000 cu m balloon. The vehicles were released and propelled to test conditions with rocket engines. A 117,940 cu m balloon carried the test vehicle to an altitude of 27.5 km and the conditions for the subsonic tests were achieved in free fall. Aeroshell separation occurred on all test vehicles from 8 to 14 seconds after parachute deployment. This report describes: (1) the test vehicle; (2) methods used to insure that the test conditions were achieved; and (3) the balloon system design and operations. The report also presents the performance data from onboard and ground based instruments and the results from a statistical trajectory program which gives a continuous history of test-vehicle motions. Author

N75-10148*# Chrysler Corp., New Orleans, La. Space Div.

EFFECTS OF REACTION CONTROL SYSTEM JET FLOW FIELD INTERACTIONS ON THE AERODYNAMIC CHARACTERISTICS OF A 0.010-SCALE SPACE SHUTTLE ORBITER MODEL IN THE LANGLEY RESEARCH CENTER 31 INCH CFHT (OA85)

J. J. Daileda (Rockwell Intern., Downey, Calif.) and J. Marroquin Sep. 1974 202 p refs

(Contract NAS9-13247)

(NASA-CR-134111; DMS-DR-2113) Avail: NTIS HC $7.25 CSCL 22B

An experimental investigation was conducted to obtain detailed effects on supersonic vehicle hypersonic aerodynamic and stability and control characteristics of reaction control system jet flow field interactions with the local vehicle flow field. A 0.010-scale model was used. Six-component force data and wing, elevon, and body flap surface pressure data were obtained through an angle-of-attack range of -10 to +35 degrees with 0 deg angle of sideslip. The test was conducted with yaw, pitch and roll jet simulation at a free-stream Mach number of 10.3 and reaction control system plume simulation of flight dynamic pressures of 5, 10 and 20 PSF. Author

N75-10149# Toronto Univ. (Ontario).

ANALYSIS AND DESIGN OF A FIXED-WHEEL ATTITUDE STABILIZATION SYSTEM FOR A STATIONARY SATELLITE

J. K. Nor Jan. 1974 80 p refs

(UTIAS-188; ISSN-0082-5255) Avail: NTIS HC $4.75

The dynamics of a spacecraft with an ungimballed momentum wheel is reexamined. Possible methods of compensation are analyzed, and a practical design procedure for a satellite with single channel control (no yaw sensor) is proposed. The analysis is then applied to the general case of a satellite with two channel control (with yaw sensing). Performance comparisons between the systems with and without yaw sensors are made, and effects of various system parameters are studied for the purposes of an engineering optimization. Linearized time-domain responses are derived and total impulse computations carried out as an important indicator of the projected fuel consumption. The data generated in the analytical and computational parts are used to draw conclusions applicable to the attitude control system design. Recommendations are made for engineering optimization of a control system based on weight, power, performance, total impulse and fuel consumption, reliability, redundancy, mission life and other engineering considerations. Author

N75-10150*# TRW Systems Group, Redondo Beach, Calif. Dept. of Control and Power Electronics.

MODELING AND ANALYSIS OF POWER PROCESSING SYSTEMS: FEASIBILITY INVESTIGATION AND FORMULATION OF A METHODOLOGY Final Report

J. J. Biess, Y. Yu, R. D. Middlebrook, and A. D. Schoenfeld 21 Jul. 1974 239 p refs

(Contract NAS3-17782)

(NASA-CR-134686; TRW-24888-6001-RU-00) Avail: NTIS HC $7.50 CSCL 22B

A review is given of future power processing systems planned for the next 20 years, and the state-of-the-art of power processing design modeling and analysis techniques used to optimize power processing systems. A methodology of modeling and analysis of power processing equipment and systems has been formulated to fulfill future tradeoff studies and optimization requirements. Computer techniques were applied to simulate power processor performance and to optimize the design of power processing equipment. A program plan to systematically develop and apply the tools for power processing systems modeling and analysis is presented so that meaningful results can be obtained each year to aid the power processing system engineer and power processing equipment circuit designers in their conceptual and detail design and analysis tasks. Author

N75-10151*# Chrysler Corp., New Orleans, La. Space Div.

STATIC STABILITY CHARACTERISTICS OF THE SPACE SHUTTLE EXTERNAL TANK (MSFC MODEL 458) DURING REENTRY IN THE MSFC 14-INCH TWT (TA1F)

Paul E. Ramsey (NASA. Marshall Space Flight Center), Michael K. Robertson (Northrop Services, Inc., Huntsville, Ala.), and Gary W. Winkler (Northrop Services, Inc., Huntsville, Ala.) Oct. 1974 181 p refs

(Contract NAS9-13247)

(NASA-CR-134420; DMS-DR-2145) Avail: NTIS HC $7.00 CSCL 22B

Data obtained in a wind tunnel test of a 0.003-scale modified MCR 0200 space shuttle external tank (ET) model tested at reentry conditions in the MSFC 14-inch trisonic wind tunnel are presented. This test is a continuation of a series of tests conducted to evaluate the aerodynamic characteristics of the ET during reentry. Three Mach numbers were investigated: 1.96,

3.48, and 4.96. The angle-of-attack range was -10 deg to 190 deg. Eight roll positions of the model from 0 deg to 315 deg were tested. The run schedule consisted of 162 runs. No. 120 grit was applied randomly over the model throughout the test. Author

N75-10152*# Chrysler Corp., New Orleans, La. Space Div.
EFFECT OF ELEVON GAP CONFIGURATIONS ON THE LONGITUDINAL STABILITY AND CONTROL EFFECTIVENESS OF THE 43-0 SPACE SHUTTLE ORBITER (OA118)
Terrance Hughes (Rockwell Intern., Los Angeles, Calif.) and Robert Mennell (Rockwell Intern., Los Angeles, Calif.) Aug. 1974 336 p
(Contract NAS9-13247)
(NASA-CR-134407; DMS-DR-2139) Avail: NTIS HC $9.50 CSCL 22B

Experimental aerodynamic investigations were conducted on a stingmounted 0.0405-scale representation of the 140A/B space shuttle orbiter in a 7.75 by 11-Foot low speed wind tunnel from April 24 to April 26, 1974. Differential inboard/outboard elevon panel deflections with the 6-inch gap were investigated to determine outboard panel aileron effectiveness. The elevons were deflected from +20 degrees to -40 degrees in various combinations. Aerodynamic force and moment data for the orbiter were measured in the body axis system by an internally mounted, six-component strain gage balance. The model was sting mounted with the center of rotation located at F.S. 60.172. The angle of attack range was from -10 degrees to +24 degrees. Author

N75-10153*# Chrysler Corp., New Orleans, La. Data Management Services.
EFFECTS OF AIR BREATHING ENGINE PLUMES ON SSV ORBITER SUBSONIC WING PRESSURE DISTRIBUTION, VOLUME 2
T. Soard (Rockwell International Corp.) Oct. 1974 416 p
(Contract NAS9-13247)
(NASA-CR-134417; DMS-DR-2080) Avail: NTIS HC $10.50 CSCL 22B

Data presented were obtained during wind tunnel tests of a 0.0405-scale model of the -89B ferry configuration of the space shuttle vehicle orbiter. These tests were conducted in the Rockwell International low speed wind tunnel (NAAL). The primary test objective was to investigate orbiter wing pressure distributions resulting from nacelle plumes above and below the wing. Three six-engine nacelle configurations were tested. One configuration has a twin-podded nacelle mounted above each wing and the others had one mounted below each wing. Both had a centerline twin-podded nacelle mounted below the wing. Wing pressure distribution was determined by locating static pressure bugs on the upper and lower surfaces of the left wing. Pressure bugs were also located on the upper and lower surfaces of the body flap and on the B12 afterbody fairing when it was installed. Base and balance cavity pressures were recorded and a strain gage instrumented beam in the right wing measured elevon hinge moments and normal forces. Author

N75-10154*# Chrysler Corp., New Orleans, La. Data Management Services.
PRESSURE AND HEAT FLUX RESULTS FROM THE SPACE SHUTTLE/EXTERNAL FUEL TANK INTERACTION TEST AT MACH NUMBERS 16 AND 19 Space Shuttle Aerothermodynamic data Report
E. B. Brewer (NASA. Marshall Space Flight Center) and D. R. Haberman (ARO, Inc.) Oct. 1974 79 p refs
(Contract NAS9-13247)
(NASA-CR-134418; DMS-DR-2197) Avail: NTIS HC $4.75 CSCL 22B

Heat transfer rates and pressures were measured on a 0.0175-scale model of the space shuttle external tank (ET), model MCR0200. Tests were conducted with the ET model separately and while mated with a 0.0175-scale model of the orbiter, model 21-OT (Grumman). The tests were conducted in the AEDC-VKF Hypervelocity Wind Tunnel (F) at Mach numbers 16 and 19. The primary data consisted of the interaction heating rates experienced by the ET while mated with the orbiter in the flight configuration. Data were taken for a range of Reynolds numbers from 50,000 to 65,000 under laminar flow conditions. Author

N75-10155*# Grumman Aerospace Corp., Bethpage, N.Y.
THERMAL-STRUCTURAL EVALUATION OF TD Ni-20Cr THERMAL PROTECTION SYSTEM PANELS
H. L. Eidinoff and L. Rose [1974] 81 p refs
(Contract NAS1-12277)
(NASA-CR-132487) Avail: NTIS HC $4.75 CSCL 22B

The results of a thermal-structural test program to verify the performance of a metallic/radiative Thermal Protection System (TPS) under reentry conditions are presented. This TPS panel is suitable for multiple reentry, high L/D space vehicles, such as the NASA space shuttle, having surface temperatures up to 1200 C (2200 F). The TPS panel tested consists of a corrugation-stiffened, beaded-skin TD Ni-20Cr metallic heat shield backed by a flexible fibrous quartz and radiative shield insulative system. Test conditions simulated the critical heating and aerodynamic pressure environments expected during 100 repeated missions of a reentry vehicle. Temperatures were measured during each reentry cycle; heat-shield flatness surveys to measure permanent set of the metallic components were made every 10 cycles. The TPS panel, in spite of localized surface failures, performed its designated function. Author

N75-10156*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
FREQUENCY STANDARD STABILITY FOR DOPPLER MEASUREMENTS ON-BOARD THE SHUTTLE
P. L. Harton Jul. 1974 110 p refs Prepared by Lockheed Electron. Co., Houston, Tex.
(Contract NAS9-12200)
(NASA-TM-X-72030; JSC-09106; LEC-3964) Avail: NTIS HC $5.25 CSCL 22B

The short and long term stability characteristics of crystal and atomic standards are described. Emphasis is placed on crystal oscillators because of the selection which was made for the shuttle baseline and the complexities which are introduced by the shuttle environment. Attention is given, first, to the definitions of stability and the application of these definitions to the shuttle system and its mission. Data from time domain measurements are used to illustrate the definitions. Results of a literature survey to determine environmental effects on frequency reference sources are then presented. Finally, methods of standard frequency dissemination over radio frequency carriers are noted as a possible means of measuring absolute accuracy and long term stability characteristics during on one way Doppler equipment. Author

N75-10157*# TRW Systems Group, Redondo Beach, Calif.
PRECISION POINTING CONTROL SYSTEM (PPCS) SYSTEM DESIGN AND ANALYSIS Final Technical Report
A. M. Frew, D. F. Eisenhut, R. L. Farrenkopf, R. F. Gates, R. P. Iwens, D. K. Kirby, R. J. Mann, D. J. Spencer, H. S. Tsou, and J. G. Zaremba 1 Jul. 1972 439 p refs
(Contract NAS5-21111)
(NASA-CR-139132; TRW-13900-6012-R0-01) Avail: NTIS HC $11.25

The precision pointing control system (PPCS) is an integrated system for precision attitude determination and orientation of gimbaled experiment platforms. The PPCS concept configures the system to perform orientation of up to six independent gimbaled experiment platforms to design goal accuracy of 0.001 degrees, and to operate in conjunction with a three-axis stabilized earth-oriented spacecraft in orbits ranging from low altitude (200-2500 n.m., sun synchronous) to 24 hour geosynchronous, with a design goal life of 3 to 5 years. The system comprises two complementary functions: (1) attitude determination where the attitude of a defined set of body-fixed reference axes is determined relative to a known set of reference axes fixed in inertial space; and (2) pointing control where gimbal orientation is controlled, open-loop (without use of payload error/feedback) with respect to a defined set of body-fixed reference axes to produce pointing to a desired target. Author

N75-10158# Royal Aircraft Establishment, Farnborough (England).
ON POWER CONDITIONING FOR SATELLITE STABILISATION THRUSTERS
C. Landrault Jun. 1974 26 p refs Transl. into ENGLISH from the French Presented at the LAAS Conf. on Elec: Propulsion in its Space Appl., Toulouse, 1972

(RAE-Lib-trans-1771; BR42669) Avail: NTIS HC $3.75

The characteristics and constraints connected with power conditioning systems necessary for the operation of three kinds of electric microthrusters are described. The types of microthrusters are: (1) ion thrusters, (2) colloid thrusters, and (3) plasma thrusters. Possible solutions to the stabilization problems and the analysis of the aspects to which particular attention is required are examined. Author

N75-10159# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Mechanik und Bewegungssimulation.

DYNAMIC SIMULATION FACILITY FOR SATELLITE ATTITUDE CONTROL SYSTEMS

Hans Holzach, Juergen Puls, and Konrad Reinel May 1974 111 p refs In GERMAN; ENGLISH summary

(BMFT-FB-W-74-02) Avail: NTIS HC $5.25; ZLDI, Munich 23.35 DM

A dynamical test facility was constructed for the evaluation and acceptance tests of the attitude control system of the satellite Symphonie. The actual components of the attitude control system are used as hardware in the simulation. The dynamical test facility consists of a servo driven motion simulator to duplicate the actual attitude of the satellite, the stimulators for the earth - and the sun sensor, and an analog computer to simulate the dynamics of the satellite. Author (ESRO)

N75-10160# British Aircraft Corp. (Operating) Ltd., Bristol (England). Guided Weapons Technical Publications Dept.

STUDY OF AN INTERFACE STRUCTURE DESIGN, PHASE 1 Final Report

D. W. Baston (Contraves AG) and K. J. Zimmermann Nov. 1973 191 p refs

(Contract ESTEC-1832/72-AA)

(ESS/SS-526; ESRO-CR(P)-473) Avail: NTIS HC $7.00

A study on optimum structures for interfacing launch vehicles and satellites was performed. The objective was to obtain some form of standardization of the various interface structural designs that were used on or proposed for different types of European spacecraft. The constraints of the various current launch vehicles and spacecraft are summarized: the requirements for the interface structures are defined; a wide variety of structural solutions is proposed; and a trade-off is completed from which two structural solutions emerge for two separately defined spacecraft missions. The chosen spacecraft missions are geosynchronous and low earth orbit resulting in a conical type structure and a flat platform, respectively. Both structural solutions are manufactured from beryllium. ESRO

N75-10161# Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Systemes Balistiques et Spatiaux.

DESIGN AND DEVELOPMENT OF A MOMENTUM WHEEL WITH A MAINLY PASSIVE MAGNETIC BEARING. VOLUME 1: DESIGN REPORT, PHASE 1

31 May 1974 61 p

(Contract ESTEC-2038/73-PP)

(ESRO-CR(P)-505-Vol-1) Avail: NTIS HC $4.25

Work performed on the design of momentum wheels with magnetic bearings is reported. The realization of a momentum wheel on mainly passive magnetic bearings constitutes a problem which so far has not led to a complete solution. A beginning was made with the realization of an intermediary experimental model. ESRO

N75-10162# Analytic Sciences Corp., Reading, Mass.

DIRECT STATISTICAL ANALYSIS OF MISSILE GUIDANCE SYSTEMS VIA CADET (COVARIANCE ANALYSIS DESCRIBING FUNCTION TECHNIQUE) Final Report

James H. Taylor and Charles F. Price 1 Aug. 1974 189 p refs

(Contract N00014-73-C-0213; NR Proj. 215-214)

(AD-783098; TASC-TR-385-1) Avail: NTIS CSCL 17/7

The Covariance Analysis Describing Function Technique (CADET) -- a technique for the efficient direct statistical analysis of nonlinear systems with random inputs -- is extended in scope to permit the study of a complicated, highly nonlinear model for a tactical missile homing guidance system. Numerous parameter sensitivity studies are performed with selected cases verified by the monte carlo method. The validity of the assumptions underlying the CADET theory is investigated and the impact of possible errors in these assumptions on the accuracy of CADET is assessed. In every realistic situation studied, CADET provided accurate missile performance projections with a small fraction of the computer time required for a comparably reliable monte carlo analysis. Author (GRA)

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N75-10163*# Aerojet Liquid Rocket Co., Sacramento, Calif.

INTEGRATED THRUSTER ASSEMBLY PROGRAM Final Report, 30 Jun. 1972 - 30 Nov. 1973

30 Nov. 1973 508 p refs

(Contract NAS3-15850)

(NASA-CR-134509) Avail: NTIS HC $10.50 CSCL 21H

The program is reported which has provided technology for a long life, high performing, integrated ACPS thruster assembly suitable for use in 100 typical flights of a space shuttle vehicle over a ten year period. The four integrated thruster assemblies (ITA) fabricated consisted of: propellant injector; a capacitive discharge, air gap torch type igniter assembly; fast response igniter and main propellant valves; and a combined regen-dump film cooled chamber. These flightweight 6672 N (1500 lb) thruster assemblies employed GH2/GO2 as propellants at a chamber pressure of 207 N/sq cm (300 psia). Test data were obtained on thrusted performance, thermal and hydraulic characteristics, dynamic response in pulsing, and cycle life. One thruster was fired in excess of 42,000 times. Author

N75-10164*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

SSME/SIDE LOADS ANALYSIS FOR FLIGHT CONFIGURATION, REVISION A

Wayne Holland Sep. 1974 89 p Revised

(NASA-TM-X-64841) Avail: NTIS HC $4.75 CSCL 21H

This document describes the dynamic loads analysis accomplished for the Space Shuttle Main Engine (SSME) considering the side load excitation associated with transient flow separation on the engine bell during ground ignition. The results contained herein pertain only to the flight configuration. A Monte Carlo procedure was employed to select the input variables describing the side load excitation and the loads were statistically combined. This revision includes an active thrust vector control system representation and updated orbiter thrust structure stiffness characteristics. No future revisions are planned but may be necessary as system definition and input parameters change. Author

N75-10165*# North Carolina State Univ., Raleigh.

DEVELOPMENT OF HIGH TEMPERATURE MATERIALS FOR SOLID PROPELLANT ROCKET NOZZLE APPLICATIONS Quarterly Progress Report, 1 Apr. - 1 Oct. 1971

Charles R. Manning, Jr. and LeRoy Honeycutt, III 15 Oct. 1974 24 p

(Grant NGR-34-002-108)
(NASA-CR-140666; QPR-3) Avail: NTIS HC $3.25 CSCL 21H

Evaluation of tantalum carbide-tungsten fiber composites has been completed as far as weight percent carbon additions and weight percent additions of tungsten fiber. Extensive studies were undertaken concerning Young's Modulus and fracture strength of this material. Also, in-depth analysis of the embrittling effects of the extra carbon additions on the tungsten fibers has been completed. The complete fabrication procedure for the tantalum carbide-tungsten fiber composites with extra carbon additions is given. Microprobe and metallographic studies showed the effect of extra carbon on the tungsten fibers, and evaluation of the thermal shock parameter fracture strength/Young's Modulus is included. Author

N75-10166*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LIQUID ROCKET ENGINE TURBOPUMP GEARS NASA Space Vehicle Design Criteria (Chemical Propulsion)
Mar. 1974 117 p refs
(NASA-SP-8100) Avail: NTIS HC $5.25 CSCL 21H

Design and fabrication of gear drives for rocket engine turbopumps are described in the sequence encountered during the design process as follows: (1) selection of overall arrangement; (2) selection of gear type; (3) preliminary sizing; (4) lubrication system design; (5) detail tooth design; (6) selection of gear materials; and (7) gear fabrication and testing as it affects the design. The description is oriented towards the use of involute spur gears, although reference material for helical gears is also cited. Author

N75-10167*# Rocketdyne, Canoga Park, Calif.
SPACE SHUTTLE ORBIT MANEUVERING ENGINE REUSABLE THRUST CHAMBER PROGRAM Tasks 5 and 8 Data Dump One Demonstrator Thrust Chamber Test Report
R. P. Pauckert, M. C. Yost, and R. D. Tobin [1973] 112 p
(Contract NAS9-12802)
(NASA-CR-140321; ASR-73-349) Avail: NTIS HC $5.25 CSCL 21H

Tests were conducted on the regenerative cooled thrust chamber of the space shuttle orbit maneuvering engine. The conditions for the tests and the durations obtained are presented. The tests demonstrated thrust chamber operation over the nominal ranges of chamber pressure mixture ratio. Variations in auxiliary film coolant flowrate were also demonstrated. High pressure tests were conducted to demonstrate the thrust chamber operation at conditions approaching the design chamber pressure for the derivative space tug application. Author

N75-10168*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MARINER MARS 1971 ATTITUDE CONTROL SUBSYSTEM
Rance S. Edmunds 15 Sep. 1974 140 p refs
(Contract NAS7-100)
(NASA-CR-140706; JPL-TM-33-681) Avail: NTIS HC $5.75 CSCL 22B

The Mariner Mars 1971 attitude control subsystem (ACS) is discussed. It is comprised of a sun sensor set, a Canopus tracker, an inertial reference unit, two cold gas reaction control assemblies, two rocket engine gimbal actuators, and an attitude control electronics unit. The subsystem has the following eight operating modes: (1) launch, (2) sun acquisition, (3) roll search, (4) celestial cruise, (5) all-axes inertial, (6) roll inertial, (7) commanded turn, and (8) thrust vector control. In the celestial cruise mode, the position control is held to plus or minus 0.25 deg. Commanded turn rates are plus or minus 0.18 deg/s. The attitude control logic in conjunction with command inputs from other spacecraft subsystems establishes the ACS operating mode. The logic utilizes Sun and Canopus acquisition signals generated within the ACS to perform automatic mode switching so that dependence of ground control is minimized when operating in the sun acquisition, roll search, and celestial cruise modes. The total ACS weight is 65.7 lb, and includes 5.4 lb of nitrogen gas. Total power requirements vary from 9 W for the celestial cruise mode to 54 W for the commanded turn mode. Author

N75-10169*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
VIKING ORBITER 1975 THRUST VECTOR CONTROL SYSTEM ACCURACY
L. F. McGlinchey 15 Oct. 1974 79 p
(Contract NAS7-100)
(NASA-CR-140705; JPL-TM-33-703) Avail: NTIS HC $4.75 CSCL 22C

The thrust vector control (TVC) system of the Viking Orbiter 1975 is discussed. The purpose of the TVC system is to point the engine thrust at the vehicle center of mass and to maintain attitude stability during propulsive maneuvers. This is accomplished by mounting the engine in a two-axis gimbal system. The TVC system then controls the pointing of the engine by closed loop control of two linear actuators which extend or retract and rotate the engine in its gimbal system. The effect of the TVC on the velocity vector pointing error incurred during a propulsive maneuver is analyzed. Models for predicting the magnitude of the error for various propulsive maneuvers are developed. Author

N75-10170*# Chrysler Corp., New Orleans, La. Data Management Services.
RESULTS OF REACTION CONTROL SYSTEM ON-ORBIT JET SIMULATION USING AN 0.0175-SCALE CONFIGURATION 3 SPACE SHUTTLE ORBITER MODEL (21-0) IN THE LaRC 60-FOOT VACUUM SPHERE Space Shuttle Aerothermodynamic Data Report
J. Marroquin (Rockwell International Corp.) Oct. 1974 55 p refs
(Contract NAS9-13247)
(NASA-CR-134415; DMS-DR-2172) Avail: NTIS HC $4.25 CSCL 21H

An experimental investigation was conducted to obtain detailed effects of the RCS jet flow direct impingement on the orbiter during on-orbit flight of the space shuttle vehicle. RCS flow was simulated by blowing a jet of cold air from nozzles attached to the model sting support system near the fuselage base. Thrust was obtained by setting the nozzle plenum pressure. Three RCS on-orbit flight conditions were simulated. Six component force data were measured on the complete model. Author

N75-10171*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CENTAUR FEEDLINE DYNAMICS STUDY USING POWER SPECTRAL METHODS
Carl F. Lorenzo Washington Nov. 1974 72 p refs
(NASA-TM-X-3111; E-7482) Avail: NTIS HC $4.25 CSCL 21H

Tests were conducted to determine the dynamic characteristics of the Centaur/RL-10 oxygen and hydrogen feedlines. The fundamental-mode resonant frequencies were determined by applying power spectral methods to noise-generated data from hot firings of the RL-10 engine. The effect of net positive suction pressure of the main feed pumps on resonant frequency characteristics was determined to be a straight-line relation. Power spectral methods were also used to determine the dynamic characteristics of the boost pumps. Author

N75-10172*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FABRICATION OF LIQUID-ROCKET THRUST CHAMBERS BY ELECTROFORMING
Rudolph A. Duscha and John M. Kazaroff Washington Nov. 1974 52 p refs
(NASA-TM-X-3116; E-7987) Avail: NTIS HC $4.25 CSCL 21H

Electroforming has proven to be an excellent fabrication method for building liquid rocket regeneratively cooled thrust chambers. NASA sponsored technology programs have investigated both common and advanced methods. Using common procedures, several cooled spool pieces and thrust chambers have been made and successfully tested. The designs were made possible through the versatility of the electroforming procedure, which is not limited to simple geometric shapes. An advanced method of electroforming was used to produce a wire-wrapped, composite, pressure-loaded electroformed structure, which greatly increased the strength of the structure while still retaining the advantages of electroforming. Author

N75-10173# European Space Research Organization, Paris (France).
HEAT TRANSFER INVESTIGATIONS OF A REGENERATIVELY COOLED, 1 kN THRUST, FLUORINE/AMMONIA ENGINE
Josef Reinkenhof 23 Jan. 1974 57 p refs Transl. into ENGLISH of Waermetransportuntersuch. zur Regenerativkuehlung eines Fluor/Ammoniak-Triebwerks mit 1 kN Schub, DLR-FB-74-12, DFVLR, 23 Jan. 1974
(ESRO-TT-93; DLR-FB-74-12) Avail: NTIS HC $4.25; DFVLR, Porz, West Ger. 22.10 DM

The regenerative cooling of a fluorine/ammonia engine equipped with a pentad injection system was investigated. Cooling characteristics of ammonia are explained. The injection-system-characterized heat flux was determined. The theory used in the analysis of experimental results is explained. Pre-test results of the similar combination oxygen/ammonia were considered and typical results chosen from the tests of the fluorine/ammonia engine are explained. The influence of the injection system on heat transfer in the expansion nozzle is discussed.
Author (ESRO)

N75-10174# Southampton Univ. (England). Dept. of Electrical Engineering.
PARAMETRIC INVESTIGATION OF A LINEAR EDGE COLLOID THRUSTER Final Report
M. R. Mahdavi, B. Makin, and A. W. Bright Apr. 1974 51 p refs
(Contract ESTEC-1779/72-AA)
(ESRO-CR(P)-485) Avail: NTIS HC $4.25

A number of linear single edge colloid thrusters were investigated in order to optimize the shoulder radius, r, and the blade protrustion length, l. It was found that the operating voltage required to achieve a given thrust, at constant values of mass flow rate and thruster current, decreases with increasing values of l/r for l/r less than 3. Identical performances were obtained at l/r ratios of 3, 4, and 5.5. Thus, for l/r greater than 3 the electrostatic shielding of the emitting tip by the shoulders becomes negligible. Thrust of up to 120 micron per cm length of the emitting edge were obtained at exhaust velocities of 14 km/sec and efficiencies of about 80%. Higher exhaust velocities were obtained (greater than 20 km/sec), but at reduced efficiencies of 50 to 60%.
ESRO

N75-10175# Marconi Space and Defence Systems Ltd., Camberley (England).
STUDY OF THE ATTITUDE AND ORBITAL CONTROL PROPULSION SUBSYSTEM FOR THE IME-D PROJECT
C. Brown, comp. Nov. 1973 76 p
(Contract ESRO-1884/73-PP)
(T(F)S/033; ESRO-CR(P)-502) Avail: NTIS HC $4.75

Three different propellants, Freon-14, nitrogen and propane, were evaluated for use in the attitude and orbital control propulsion subsystem. Systems to meet the requirements for each propellant and defined, and the resulting masses, reliabilities, and thermal characteristics, cost, hardware availability, and testing requirements are compared. It is concluded that a propane system is the most satisfactory.
ESRO

N75-10176# Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
PYROLYTIC GRAPHITE COATED THROAT INSERTS
William F. Payne Aug. 1974 56 p refs Presented at the 9th AIAA/SAE Joint Propulsion Specialist Conf., Las Vegas, Nev., Nov. 1973
(AF Proj. 3059)
(AD-783849; AFRPL-TR-74-42; AIAA-73-1260) Avail: NTIS CSCL 21/8

A review is presented of efforts to develop and demonstrate PG coated throat inserts in solid propellant rocket nozzles. Discussion of modification attempts such as SiC, HfC and ZrC additions and chemically graded coatings is included. Selected test results on thermal expansion and erosion rates are provided. (Modified author abstract)
GRA

N75-10177# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
LASER ROCKET ENGINES
T. Andreev 5 Jul. 1974 14 p Transl. into ENGLISH from Voenna Tekn. (Bulgaria), no. 6, 1973 p 20-22
(FTD Proj. T74-05-14)
(AD-784016; FTD-HC-23-2058-74) Avail: NTIS CSCL 21/8

The concept of an earth-based laser energizing a rocket engine is discussed along with the concept of placing the laser aboard the rocket. Laser technology for designing reaction engines is also discussed.
F.O.S.

N75-10178# Applied Theory, Inc., Los Angeles, Calif.
NUMERICAL SOLUTION OF THE NAVIER-STOKES EQUATIONS FOR ROCKET PLUMES AT 120 km ALTITUDE Final Technical Report
L. C. Himmell and J. G. Trulio Jul. 1974 79 p refs
(Contract N00014-71-C-0331; ARPA Order 1801)
(AD-784332; ATR-74-33-1) Avail: NTIS CSCL 20/4

Results are presented of a first-principle calculation of steady flow to a distance of 300 ft aft of an Atlas booster emitting exhaust gases. Agreement between the air shock locus reported and that predicted by the simpler model of Boynton, improves with distance from the vehicle. Boynton's air-plume shock radius is smaller by factors of 2.2, 1.8 and 1.5, at distances of 100, 200, and 300 ft, respectively, aft of the vehicle. For the jet shock, the corresponding ratios at the same three downstream locations are 1.5, 1.1 and 1.0, respectively. No evidence of Helmholtz instability was found in the calculated flow-field.
Author (GRA)

N75-10220 Joint Publications Research Service, Arlington, Va.
SOME CHARACTERISTICS OF EShP OF METAL IN CONSUMABLE CRYSTALLIZERS
B. I. Medovar, Yu. G. Yemelyanenko, D. A. Kozlitin, Yu. A. Sterenbogen, N. A. Tsvyashchenko, I. N. Khoroshko, and A. I. Borovko *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 96-100 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 96-100 (For availability see N75-10212 01-26)

N75-10368 European Space Research Organization, Paris (France).
DUAL MODE RAMJET THEORETICAL AND EXPERIMENTAL PERFORMANCE FOR MACH 3.5 TO 7 DOMAIN OF FLIGHT VELOCITIES
Pierre Contensou, Roger Marguet, Charles Huet et al *In its* Aerospace Res. (ESRO-TT-40) Apr. 1974 p 1-33 refs Transl. into ENGLISH from La Rech. Aerospatiable, Bull. Bimestriel No. 1973-5, ONERA 1973, p 259-274 (For availability see N75-10367 01-34)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N75-10179 New Mexico Univ., Albuquerque.
THERMAL OXIDATION OF GALLIUM ARSENIDE PHOSPHIDE Ph.D. Thesis
Leo Edward Coerver 1973 231 p
Avail: Univ. Microfilms Order No. 74-20349

Lightly doped GaAs sub (1-x) P sub x material with a phosphorous mole fraction of 0.50 + or - 0.02 was oxidated first in open tubes, and then at atmospheric pressure. Initial studies over a wide range of oxidation temperatures showed that serious surface damage to the semiconductor surface occurred if the oxidation temperature was greater than 700 C. An anneal in an inert atmosphere at a temperature no greater than 700 C for at least 90 minutes was required to obtain good pinhole-free dielectrics. The film is neither single crystal nor amorphous but is composed of crystallites of less than 1/2 micron diameter. The upper bound on the oxidation temperature was found to be explained by arsenic sublimation as As2 and As4 molecules and by phosphorus sublimation as P2 molecules. Theory is developed for the growth of volatile-element-free pits in the semiconductor surface.
Dissert. Abstr.

N75-10180# National Bureau of Standards, Washington, D.C. Physical Chemistry Div.
CHEMICAL KINETICS DATA SURVEY. 5. SIXTY-SIX CONTRIBUTED RATE AND PHOTOCHEMICAL DATA EVALUATIONS ON NINETY-FOUR REACTIONS Interim Report
David Garvin, ed. May 1973 117 p refs
(NBSIR-73-206) Avail: NTIS HC $5.25

The data evaluations contributed to the climatic impact assessment program chemical kinetics survey during the period Nov. 1972 - April 1973 by various kineticists and photochemists are included for reactions of O (D-1), O (S-1), O2 (delta-1), CH3ONO, CH3O CH3O2 H2O2, HO2, SO, SO2, and the H2-N2-O2 system. Author

N75-10181*# Worcester Polytechnic Inst., Mass. Dept. of Chemical Engineering.
PRODUCTION OF EDIBLE CARBOHYDRATES FROM FORMALDEHYDE IN A SPACECRAFT. pH VARIATIONS IN THE CALCIUM HYDROXIDE CATALYZED FORMOSE REACTION Final Report, 1 Jul. 1973 - 30 Jun. 1974. M.S. Thesis
Alvin H. Weiss, J. T. Kohler, and Tom John 30 Jun. 1974 77 p refs Sponsored in part by NSF
(Grants NGR-22-017-024; NGR-22-017-023)
(NASA-CR-140684) Avail: NTIS HC $4.75 CSCL 07C

The study of the calcium hydroxide catalyzed condensation of formaldehyde was extended to a batch reactor system. Decreases in pH were observed, often in the acid regime, when using this basic catalyst. This observation was shown to be similar to results obtained by others using less basic catalysts in the batch mode. The relative rates of these reactions are different in a batch reactor than in a continuous stirred tank reactor. This difference in relative rates is due to the fact that at any degree of advancement in the batch system, the products have a history of previous products, pH, and dissolved catalyst. The relative rate differences can be expected to yield a different nature of product sugars for the two types of reactors. Author

N75-10182# New York Univ., N.Y. AEC Computing and Applied Mathematics Center.
HELIUM AT ZERO TEMPERATURE WITH HARD-SPHERE AND OTHER FORCES
M. H. Kalos, D. Levesque, and L. Verlet Sep. 1973 71 p refs
(Contract AT(11-1)-3077)
(COO-3077-35) Avail: NTIS HC $4.25

Various theoretical and numerical problems relating to helium-like systems in their ground states are treated. New developments in the numerical solution of the Schrodinger equation permit the solution of 256 body systems with hard-sphere forces. Using periodic boundary conditions, fluid and crystal states can be described; results for the energy and radial distribution functions are given. A new method of correcting for low lying phonon excitations so as to extrapolate the energy of fluids to an infinite system is described. A perturbation theory relating the properties of the system with pure hard sphere forces to those with smoother, more realistic two body forces is introduced. As in recent work on classical systems the potential is divided into two continuous parts; one is repulsive, one attractive, the latter being treated as a perturbation. The solution for the repulsive part is taken directly from the hard sphere problem when the radius is identified as the scattering length of the repulsive part of the smooth potential. Author (NSA)

N75-10183# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HEAT RESISTANT COATINGS OBTAINED BY CHEMICAL DEPOSITION FROM SOLUTIONS
A. V. Ryabchenkov, V. V. Ovsyankin, and Yu. A. Zotev 10 Jul. 1974 20 p refs Transl. into ENGLISH from the monograph "Trudy v Vsesoyuznogo Soveshchaniya po Zharostoikim Pokrytiyam" USSR, 1972 p 238-248
(AD-783981; FTD-HT-23-1307-74) Avail: NTIS CSCL 07/4

The authors studied the mechanism and kinetics of the diffusion reaction of the nickel-phosphorus coating to the steel sublayer. GRA

N75-10184# Air Force Academy, Colo. Frank J. Seiler Research Lab.
EXPERIMENTAL MEASUREMENT OF INTERNAL CHARACTERISTICS OF SPECTRAL LINES USING THE ROSCHDESTVENSKII HOOK METHOD Final Scientific Report, Dec. 1971 - Apr. 1974
Carl A. Forbrich, Jr. Jun. 1974 41 p refs Sponsored in part by AFWL
(AF Proj. 7905)
(AD-783614;SRL-TR-74-0013) Avail: NTIS CSCL 07/4

The theoretical development of the information that can be obtained from an analysis of the inner hooks of the Roschdestvenskii hook method is presented. The results of the experiments performed using the H-alpha line of excited hydrogen gas to substantiate the inner hook theory for determining the structure of spectral lines are additionally presented. These results are discussed and are determined to be inconclusive due to the low dispersion of the assembled hook method apparatus. The technique has potential application to gas dynamic and especially to two difficult problems encountered in reentry phenomena: (1) measurement of the radiation absorption characteristics of molecular species and (2) mapping of species concentrations in nonequilibrium flow fields. GRA

N75-10185# Northwestern Technological Inst., Evanston, Ill. Materials Research Center.
[RESEARCH ON VARIED PROPERTIES OF METALS, CERAMICS, POLYMERS, AND ALLOYS] Annual Technical Research No. 14, 1 Sep. 1972 - 31 Aug. 1973
Feb. 1974 187 p refs
(Grant NSF GH-33575)
(AD-783964) Avail: NTIS CSCL 20/12

The report contains condensed summaries of research activities at the Materials Research Center from September 1, 1972 to August 31, 1973. Topics include; electronic properties of materials, fatigue and fracture of materials, polymeric materials, alloy development, surface phenomena, ceramic materials, materials for energy storage (solid electrolytes), biomaterials, and synthesis and properties of transition metal complexes. GRA

24 COMPOSITE MATERIALS

Includes laminates.

N75-10186# Grumman Aerospace Corp., Bethpage, N.Y. Research Dept.
EFFECT OF WATER ON THE PROPERTIES OF A GLASS-POLYIMIDE LAMINATE
Richard Delasi Aug. 1974 23 p refs
(RM-589) Avail: NTIS HC $3.25

Effects of accelerated hydrolytic aging on glass-polyimide laminates were investigated. The degradation rate of the modulus of rupture of the laminate showed small variations that appeared to depend on differences in the cure and post cure cycles. The calculated values of the activation energy and entropy for the degradation indicate that the probable mechanism of attack in water and flowing steam is selective hydrolysis of uncyclized amic acid groups. This causes a decrease in average molecular weight of the matrix with subsequent breakdown of the polymer-fiber interface. The computed value of the activation energy for a single laminate was used to illustrate the calculation of degradation rates and service lifetime of the same or other laminates under various conditions of temperature and water vapor pressure. Author

N75-10187# Royal Aircraft Establishment, Farnborough (England).
DIRECTIONALLY SOLIDIFIED Co-Cr-C COMPOSITES. MICROSTRUCTURE AND STRENGTH BETWEEN 20 C AND 1050 C OBTAINED BY DIFFERENT SOLIDIFICATION MODES
K. Fritscher, G. Wirth, and W. Bunk Jun. 1974 64 p refs Transl. into ENGLISH from the German report DLR-FB-73-27 (RAE-Lib-Trans-1764; BR42668; DLR-FB-73-37) Avail: NTIS HC $4.25

Alloys of the system Co-Cr-C containing the phase gamma

Co,Cr and (Cr,Co)7C3 were directionally solidified using the Bridgman technique. The resulting microstructures were investigated for variation with solidification rate, temperature gradient, and composition. In the case of a directionally solidified hyper eutectic alloy containing 32.5 v/o carbide fibers tensile tests were performed between room temperature and 1050 C, and tensile strength elongation, and fracture appearance were determined. Room temperature tensile strength depends on fiber spacing and cell formation, whereas the high temperature strength is a function of fiber spacing only. Elongation to fracture is minimized at medium temperatures. Author

N75-10188# Bendix Corp., Kansas City, Mo.
PROTECTION OF GLASS TUBES IN EPOXY ENCAPSULATION
J. W. Steele Mar. 1974 78 p refs Revised
(Contract AT(29-1)-613)
(BDX-613-931-Rev) Avail: NTIS HC $4.75

A glass electron tube was breaking during a thermal cycle test after being potted in glass microballoon filled epoxy. Encasement requirements were established, experiments were designed, and information accumulated. After data from experiments was studied, two proposed designs were evaluated and one, a closed cell silicone rubber sponge extruded sleeve, was found to provide the required tube protection. Author (NSA)

N75-10189# Sandia Corp., Albuquerque, N.Mex.
HEAT TRANSFER IN HIGH TEMPERATURE OPACIFIED FIBER INSULATION
L. G. Rainhart, R. U. Acton, and A. B. Donaldson 1973 16 p refs Presented at the 13th Intern. Conf. on Thermal Conductivity, Lake Ozark, Mo., 5 Nov. 1973 Sponsored by AEC
(SLA-73-5677; Conf-731106-6) Avail: NTIS HC $3.25

Because of excessive carbon heat shield temperatures during vehicle reentry, it is necessary to thermally isolate the heat shield from the substructure. This is accomplished by a high temperature carbon fiber insulation. Under such conditions as high temperature, low bulk density, and low interstitial gas pressure, the net heat transfer is reduced by reducing the radiation component with graphite flake radiation barriers. The insulation, its manufacture, the thermal model that evolved for characterizing the heat transfer through the material, and the comparison of the model predictions with data as a function of the variable under study are described. Author (NSA)

N75-10190# Naval Postgraduate School, Monterey, Calif.
LABORATORY DEVELOPMENT AND TENSILE TESTING OF GRAPHITE/GLASS/EPOXY HYBRID COMPOSITE MATERIALS M.S. Thesis
Robert James Linnander Jun. 1974 70 p refs
(AD-783860) Avail: NTIS CSCL 11/4

Most advanced composite materials in use today consist of a single type of reinforcing fiber embedded in a matrix. There are possible advantages, however, in a system which used multiple types of reinforcing fibers. Such a material is called a hybrid or mixed modulus composite. This thesis describes the establishment of a composites laboratory facility at the Naval Postgraduate School and the development of manufacturing techniques to produce high-quality hybrid composite specimens for testing. Glass/graphite/epoxy hybrid specimens manufactured in this laboratory were tested to determine the dependence of material properties on the relative orientations of the fibers. Results of the test program were compared with predictions made using classical laminate theory. Author (GRA)

N75-10191# Ballistic Research Labs., Aberdeen Proving Ground, Md.
RESPONSE OF BORON-EPOXY COMPOSITE TO IMPACT LOADING
W. S. DeRosset Jun. 1974 40 p refs
(DA Proj. 1W1-62113-A-660)
(AD-784600; BRL-MR-2394) Avail: NTIS CSCL 11/4

The response of boron-epoxy composite to plate impact was measured with Manganin gages in both a single and double gage configuration. Calibration data for the Manganin gages were obtained in the pressure range of 579 to 778 MPa. Pressure measurements were used along with other experimentally determined parameters to determine the Hugoniot relation for the composite, assuming that it behaved as a homogeneous, isotropic material. Two modes of failure were observed in the target as a result of the plate impact. The first was attributed primarily to the action of the compressive wave, and the second was caused by the reflected tensile wave. The spall threshold for the composite was found to be 390 MPa (3.9 kilobars) tensile stress. Author (GRA)

N75-10192# Solar, San Diego, Calif.
TUNGSTEN-REINFORCED OXIDATION-RESISTANT COLUMBIUM ALLOYS Final Report, 20 Feb. 1973 - 20 Feb. 1974
Mark J. Klein and Arthur G. Metcalfe May 1974 115 p refs
(Contract N622969-69-C-0218)
(AD-783985; RDTR-1759-4) Avail: NTIS CSCL 11/4

Optimization of the columbium alloy/tungsten composites has continued for general gas turbine application in the temperature range 2000 to 2400F. Major improvements have been made in hot transverse strength, control of structural stability, Izod and ballistic impact strength, creep strength, hot corrosion at 2200F, and thermal shock resistance. These improvements have been accomplished at the expense of some loss of fail-safe life for severely damaged specimens. This composite system can be optimized for specific applications by adjustment of the matrix composition and selection of tungsten filaments with specific properties. (Modified author abstract) GRA

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N75-10193 National Bureau of Standards, Washington, D.C.
TRANSITION METAL OXIDES: CRYSTAL CHEMISTRY, PHASE TRANSITION AND RELATED ASPECTS Final Report
C. N. R. Rao (Indian Inst. of Tech., Kanpur) and G. V. SubbaRao (Indian Inst. of Tech, Kanpur) Jun. 1974 140 p refs
(NSRDS-NBS-49; LC-73-600267) Copyright. Avail: SOD HC $1.70 as C13.48:49

A survey was made of the data describing the thermodynamic of phase equilibria, crystal chemistry and phase transformations of binary oxides of 3d, 4d, and 5d transition metals. Changes in electrical, magnetic, and other properties which accompany phase transitions are discussed. Author

N75-10194*# Kanner (Leo) Associates, Redwood City, Calif.
QUANTITATIVE DETERMINATION OF BENZO/A/PYRENE IN TAR-CONTAINING DRUGS BY AN ISOTOPE DILUTION METHOD
Y. Masuda, K. Shimamura, and R. Kagawa Washington NASA Oct. 1974 12 p refs Transl. into ENGLISH from Jap. Anal. (Japan), v. 22, no. 11, Nov. 1973 p 1424-1427
(Contract NASw-2481)
(NASA-TT-F-15983) Avail: NTIS HC $3.25 CSCL 07D

Studies were made of a method of quantitative determination of the benzo/a/pyrene contained in tar-containing drugs by an isotope dilution method using tritiumized benzo/a/pyrene. Analytical procedures were performed in the following sequence: liquid phase distribution extraction method, dual-layer, one-dimensional thin layer chromatography and ultraviolet absorption spectral analysis. The rate of recovery obtained at this time varied between 30% and 80%, with a fluctuation coefficient of 15-30%. If this were corrected by the recovery ratio, the amount of benzo/a/pyrene in the sample was found in a state close to 100%, and the fluctuation coefficient was reduced to 4-9%. Even in cases when benzo/a/pyrene is not detected in a sample, its ascertainable limit can be found easily. The benzo/a/pyrene contents in pine tar, Pityrol pasta, Glyteer, and Ichthammol were 9.72, 1.32, 12.90 ppm and less than 0.05 ppm, respectively. Author

N75-10195*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ANALYTICAL CHEMICAL KINETIC INVESTIGATION OF THE EFFECTS OF OXYGEN, HYDROGEN, AND HYDROXYL RADICALS ON HYDROGEN-AIR COMBUSTION
George T. Carson, Jr. Washington Nov. 1974 65 p refs (NASA-TN-D-7769; L-9576) Avail: NTIS HC $4.25 CSCL 21B

Quantitative values were computed which show the effects of the presence of small amounts of oxygen, hydrogen, and hydroxyl radicals on the finite-rate chemical kinetics of premixed hydrogen-air mixtures undergoing isobaric autoignition and combustion. The free radicals were considered to be initially present in hydrogen-air mixtures at equivalence ratios of 0.2, 0.6, 1.0, and 1.2. Initial mixture temperatures were 1100 K, 1200 K, and 1500 K, and pressures were 0.5, 1.0, 2.0, and 4.0 atm. Of the radicals investigated, atomic oxygen was found to be the most effective for reducing induction time, defined as the time to 5 percent of the total combustion temperature rise. The reaction time, the time between 5 percent and 95 percent of the temperature rise, is not decreased by the presence of free radicals in the initial hydrogen-air mixture. Fuel additives which yield free radicals might be used to effect a compact supersonic combustor design for efficient operation in an otherwise reaction-limited combustion regime. Author

N75-10196*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
IN SITU MASS ANALYSIS OF PARTICLES BY SURFACE IONIZATION MASS SPECTROMETRY
William S. Lassiter and Allen L. Moen (Central College, Pella, Iowa) Washington Nov. 1974 17 p refs (NASA-TM-X-3112; L-9675) Avail: NTIS HC $3.25 CSCL 07D

A qualitative study of the application of surface ionization and mass spectrometry to the in situ detection and constituent analysis of atmospheric particles was conducted. The technique consists of mass analysis of ions formed as a result of impingement of a stream of particles on a hot filament where, it is presumed, surface ionization takes place. Laboratory air particles containing K, Ca, and possibly hydrocarbons were detected. Other known particles such as Al2O3, Pb(NO3)2, and Cr2O3 were analyzed by detecting the respective metal atoms making up the particles. In some cases, mass numbers indicative of compounds making up the particles were detected showing surface ionization of particles sometimes leads to chemical analysis as well as to elemental analysis. Individual particles were detected, and it was shown that the technique is sensitive to Al2O3 particles with a mass of a few nanograms. Author

N75-10197# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE IGNITION LIMIT OF A CONGLOMERATE OF METAL PARTICLES
M. A. Gurevich, E. S. Ozerov, and S. A. Chivilikhin 25 Jun. 1974 15 p refs Transl. into ENGLISH from Fiz. Goreniya Vzryva (Novosibirsk), v. 8, no. 4, Dec. 1972 p 526-532 (AD-782073; FTD-HT-23-1224-74) Avail: NTIS CSCL 21/2

A dense aggregate (conglomerate) of metal particles has a developed reaction surface, but this surface is not equally accessible to the oxidizer. An oxidizer diffuses from the surface deep into the conglomerate through its pores, being expended in oxidation of the metal. Thus, for a solution to the ignition problem one needs a calculated determination of the effective rate of heat release which, in turn, depends on the areas of concentration of the oxidizer and the metal vapors within the conglomerate. GRA

N75-10198# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDY OF PREIGNITION PROCESSES IN ZIRCONIUM, TITANIUM, AND ZIRCONIUM HYDRIDE
B. M. Zlobinskii, V. M. Maltsev, and V. V. Kurylev 1973 10 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Tsvetn. Met. (Dzaudzhikau), no. 3, 1973 p 114-116 (AD-783965; FTD-HT-23-2294-74) Avail: NTIS CSCL 21/2

The study of preignition processes stemmed from the need to more fully explain the ignition and combustion mechanisms of metals. The experiments were carried out on particles of electrolytic zirconium (99.96% Zr), magnetothermic titanium (94.6% Ti), and zirconium hydride (ZrH2). Microphotographing technique is being used to estimate the growth of oxide films on metal particles (ranging from 100 to 520 micrometers) under conditions of dynamic heating. GRA

N75-10199# Washington State Univ., Pullman. Dept. of Chemistry.
PICOSECOND FLASH PHOTOLYSIS AND SPECTROSCOPY: BIS-(4-DIMETHYLAMINODITHIOBENZIL)--Ni(2), (BDN)
Douglas Magde, Bruce A. Bushaw, and M. W. Windsor Jun. 1974 20 p refs Submitted for publication (Contract N00014-68-A-0410-003; NR Proj. 051-524) (AD-781925; TR-4; ONR-TR-4) Avail: NTIS CSCL 07/4

The transient absorption spectrum of an electronically excited dithiene, bis-(4-dimethylaminodithiobenzil)-Ni(II), BDN, was measured with 10 ps temporal resolution and 1 nm wavelength resolution. For a series of heavy atom solvents, both the ground state and the excited state spectra remained constant while the decay kinetics of the excited state absorption, as well as the recovery from ground state bleaching, varied. The excited state spectrum can plausibly be fit by a particular one electron transition between previously calculated molecular orbitals, although this clearly does not prove that these orbitals provide the best description for the excited states. The authors comment on three possibilities within the framework of the ground state virtual orbital picture. The recently developed techniques will be generally applicable in probing the photodynamics of presently intractable molecular species. The significance of the data for laser mode-locking is discussed. (Modified author abstract) GRA

N75-10200# Aerodyne Research, Inc., Burlington, Mass.
N2 SCATTERING MEASUREMENTS AT 10.6 MICRONS Final Report, 11 Jul. 1972 - 31 May 1974
Robert C. Sepucha Jul. 1974 47 p refs (Contract N00014-73-C-0025) (AD-784723; ARI-RR-51) Avail: NTIS CSCL 07/4

An experimental facility was constructed to measure the molecular scattering cross sections of atmospheric constituents at 10.6 micrometers. The system was designed to measure the cross sections relative to the radiative lifetime of the 0.4 and 10.4 micrometer bands of CO2. The calibration procedure consisted of the measurement of CO2 fluorescence following laser saturated absorption. It provided a direct measurement of the sensitivity of the apparatus. The N2 Rayleigh cross section was measured. The N2 rotational Raman scattering level, estimated to be almost two orders of magnitude below the Rayleigh level, was too low to be measured with this facility. (Modified author abstract) GRA

N75-10201# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CRYSTALS AND RADIATION: NEW HORIZONS IN THE SEARCH FOR SCIENTIFIC KNOWLEDGE
M. Elango 2 Aug. 1974 11 p Transl. into ENGLISH from Sovetskaya Estoniya (USSR), no. 304, 29 Dec. 1973 p 2 (AD-784721; FTD-HT-23-2733-74) Avail: NTIS CSCL 20/2

The effects of crystal defects on the properties of crystalline bodies are discussed with emphasis on defects induced by radiation. F.O.S.

N75-10202# Rhode Island Univ., Kingston. Dept. of Chemistry.
LASER RAMAN SPECTROSCOPY OF SOLUTES DISSOLVED IN WATER FROM A REMOTE PLATFORM Completion Report, 1 Jul. 1971 - 31 Jan. 1974
Christopher W. Brown 31 Jan. 1974 19 p refs (Contract DI-14-31-0001-3641) (PB-233432/4; W74-09255; OWRR-B-036-RI(4)) Avail: NTIS HC $3.00 CSCL 07B

An optical system for obtaining remote Raman spectra of ionic solutes dissolved in water was built and tested. At present, the system has been used to detect and identify 150 ppm of NO3(-)at a distance of 21 ft. Furthermore, the same system has been used to detect oil slicks on the surface of water, and dissolved SO4(-2), PO4(-3), and CO3(-2). GRA

N75-10203# Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
NOVEL MATERIALS FOR POWER SYSTEMS. PART 1: SCHIZOPHRENIC CATALYSTS Annual Technical Report, 1 Jun. 1973 - 31 May 1974
R. G. Squires 15 Jul. 1974 51 p refs
(Grant DAHC15-73-G-0011; ARPA Order 2338)
(AD-784447) Avail: NTIS CSCL 07/4

The oxidation of carbon monoxide and reduction of oxides of nitrogen over chromia catalysts supported on silica is currently under study. One might expect that if two otherwise identical catalysts were prepared with varied dispersions (chromium content being the same), that the reactivity would be different since the active sites, i.e., various stable surface oxidation states, may differ both in number and type. To test this simple hypothesis, a series of catalysts were prepared; series A by chromic acid impregnation and series B by chromium nitrate-oxalic acid complexing. Two series of catalysts with varied amounts of chromium were prepared to insure the existence of a region where the % Cr of both samples overlapped and where the catalyst activity as a function of % Cr could be examined.
Author (GRA)

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N75-10204 Academy of Sciences (USSR), Moscow.
STRUCTURE AND PROPERTIES OF ALLOYS FOR ATOMIC ENERGY
O. S. Ivanov, ed. and T. A. Badayeva, ed. Izdatelstvo Nauka 1973 14 p refs In RUSSIAN; ENGLISH summary
Copyright. Avail: Issuing Activity

Structures of equilibrium and metastable phases, kinetics of solid solution transformations, and the structures and physical, chemical, and mechanical properties of alloys involving bases of uranium, thorium, niobium, and zirconium, in relation to composition and temperature are reported. New data are presented on the phase equilibria in binary, ternary, and quaternary systems of uranium with C, Mo, W, Mn, Al, Si, and other elements; zirconium with Nb, Sn, and O2; and iobium with Hf and Ti. The crystalline structures and transformations of metastable phases in binary and ternary alloys of uranium with Zr, Mo, Nb, Re, Ru, and other elements observed during tempering and annealing were examined, along with the mechanical and thermoelectric properties of uranium alloys with Zr, Nb, Mo, and Al; and thorium with yttrium. General patterns of alteration in structure and properties of the alloys are indicated. Author

N75-10205 Georgia Inst. of Tech., Atlanta.
TEMPERATURE DEPENDENCE OF THE MAGNETIC EXCITATIONS IN IRON AND NICKEL Ph.D. Thesis
Jeffrey Whidden Lynn 1974 145 p
Avail: Univ. Microfilms Order No. 74-21574

The coherent magnetic inelastic scattering of neutrons was used to measure the magnetic excitations in iron and nickel from low temperatures to well above the ferromagnetic transition temperatures. In contrast to the behavior observed in the small wavevector region, where the spin waves were found to become overcritically damped just below TC, the spin waves at larger values are found to persist as well defined excitations up to the highest temperatures measured (1.4 TC for iron and 2.0 TC for nickel). The dispersion relations are only moderately renormalized up to TC, and then remain constant as the temperature is increased further. The overall spin wave intensities are reduced at higher temperatures, but the abrupt decrease in the spin wave intensity at high energies, interpreted as the intersection of the spin wave spectrum with the Stoner continuum band of spin-flip excitations, is found to be insensitive to the temperature. Dissert. Abstr.

N75-10206 Pennsylvania State Univ., University Park.
THE EFFECT OF AUSWORKING ON THE STRENGTH OF TYPE 420 STAINLESS STEEL WITH THE ADDITION OF CARBIDE-FORMING ELEMENTS Ph.D. Thesis
Raymond Francis Ober 1973 87 p
Avail: Univ. Microfilms Order No. 74-20955

The effect of ausworking on AISI Type 420 stainless steel was studied from a property and structural viewpoint. Strong carbide-forming elements (tungsten, molybdenum, titanium, and vanadium) were added to the base alloy. Five different processes were considered: no ausworking, ausworking at 550 C and 430 C, ausworking immediately upon reaching the deformation temperature and after holding the samples at the deformation temperature until the initiation of proeutectoid carbide separation occurs. The amount of deformation was always in the range 50 to 55% reduction in area. All of the samples were austenitized at 1200 C for 1/2 hour prior to ausworking and tempered for two hours at 300 C after ausworking. The proportional limit, 0.2% offset yield strength, and ultimate tensile strength were measured. The mechanical property data revealed a significant difference in the samples which were ausworked compared to those which were not deformed. Dissert. Abstr.

N75-10207*# Kanner (Leo) Associates, Redwood City, Calif.
EFFECT OF COMPOSITION ON STRESS CORROSION CRACKING OF AUSTENITIC STAINLESS STEELS IN SEVERAL CONCENTRATIONS OF BOILING MgCl2 SOLUTIONS
M. Kowaka and T. Kudo Washington NASA Nov. 1974 27 p refs Transl. into ENGLISH from Nippon Kinzoku Gakkaishi (Sendai), v. 37, Dec. 1973 p 1320-1929
(Contract NASw-2481)
(NASA-TT-F-15995) Avail: NTIS HC $3.75 CSCL 11F

The effect of composition on stress corrosion cracking of austenitic stainless steels has been investigated for several concentrations of boiling MgCl2 solutions. The stress was applied by a constant load of 25 kg/sq mm. The relation between the boiling point of MgCl2 solutions (concentration of MgCl2 solutions) and the fracture time was determined. The results obtained are as follows: (1) The boiling point of MgCl2 solutions at which the sensitivity to stress corrosion cracking is maximum decreases with increasing amounts of carbon and silicon in stainless steels. (2) With increasing amounts of molybdenum, nitrogen, phosphorus, chromium and copper, the boiling point increases. (3) Increase in nickel concentration decreases sensitivity to stress corrosion cracking in the overall concentration range of boiling MgCl2 solution. Both the periods of induction and propagation were determined by measuring potential change of 304 and 316 stainless steels in boiling MgCl2 solutions. Author

N75-10208# Bureau of Mines, Albany, Oreg. Metallurgy Research Center.
ROOM TEMPERATURE TENSILE PROPERTIES OF TITANIUM AND SEVEN TITANIUM ALLOYS PREPARED BY SKULL CASTING
E. D. Calvert and Ronald R. Lowery 1974 31 p refs
(BM-RI-7949) Avail: NTIS HC $3.75

The room temperature tensile properties of commercially pure titanium and seven titanium alloys prepared by skull casting were determined in the as-cast and heat-treated conditions. Data were compared with property data from tensile tests on wrought alloys of the same compositions in the as-worked and Ti-6Al-4V-1Si, Ti-6Al-2Sn-4Zr-2Mo, Ti-6Al-6V-4Zr-Mo, Ti-6Al-6V-2Sn, and heat-treated conditions. The alloys evaluated were Ti-5Al-2.5Sn, Ti-6Al-4V, Ti-11.5Mo-6Zr-4.5Sn. The data indicate that the alpha and alpha-beta alloys have strength properties in the as-cast condition that are reasonably close to the strength properties of their wrought counterparts in the as-worked condition. Fine-grained cast structures of Beta III (Ti-11.5Mo-6Zr-4.5Sn) were shown to be generally stronger in the as-cast condition than the wrought alloy in the as-worked condition. Heat treatment of this alloy produced properties that were unpredictable. Optimization of heat treatment parameters for each cast structure could produce strength properties equal to that of wrought materials.
Author

N75-10209*# Westinghouse Astronuclear Lab., Pittsburgh, Pa.
INTERDIFFUSION BEHAVIOR OF TUNGSTEN OR RHENIUM AND GROUP 5 AND 6 ELEMENTS AND ALLOYS OF THE PERIODIC TABLE. PART 2A: APPENDICES A-G Final Report
Frank. G. Arcella Sep. 1974 147 p refs
(Contract NAS3-13231)

(NASA-CR-134526; WANL-M-FR-74-005) Avail: NTIS HC $5.75 CSCL 11F

Arc cast W, CVD, W, CVD Re, and powder metallurgy Re materials were hot isostatically pressure welded to ten different refractory metals and alloys and thermally aged at 10 to the minus 8th power torr at 1200 C, 1500 C, 1630 C, 1800 C, and 2000 C for 100 hours to 2000 hours. Electron beam microprobe analysis was used to characterize the interdiffusion zone width of each couple system as a function of age time and temperature. Each system was least squares fitted to the equation: ln (delta X sq/t) = B/T + A, where delta X is net interdiffusion zone width, t is age time, and T is age temperature. Detailed descriptions of experimental and analytical procedures utilized in conducting the experimental program are provided. For Vol. 1, see N74-34046. Author

N75-10210*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

APPARATUS FOR MEASURING THE FERRITE CONTENT OF AUSTENITIC STAINLESS STEEL WELD MATERIAL

Patent Application

Wayman N. Clotfelter and Benjamin F. Bankston, inventors (to NASA) Filed 29 Oct. 1974 13 p

(NASA-Case-MFS-22907-1; US-Patent-Appl-SN-518546) Avail: NTIS HC $3.25 CSCL 11F

A device is provided for measuring the ferrite content of austenitic stainless steel weld material. The device includes a base plate for rotatably mounting a mechanical vernier member; the mechanical vernier member supports a cantilever beam in a manner to provide vertical positioning of the beam. Suspended from the free end of the beam is a permanent magnet below which is positioned the specimen of austenitic weld material which is to be tested. Strain gauges are provided on the top surface of the beam for measuring the magnetic force between the magnet and weld material by measuring the amount of downward deflection of the beam. The measurement is then converted into a reading which indicates the percentage of ferrite of the weld material in the joint. NASA

N75-10211*# Scientific Translation Service, Santa Barbara, Calif.

THE EFFECT OF THE TITANIUM CONTENT ON THE ACTIVE CORROSION OF FERRITIC τ-STEELS AND AUSTENITIC Cr-Ni-STEELS IN SULFURIC ACID

Guenter Herbsleb Washington NASA Oct. 1974 38 p refs Transl. into ENGLISH from Werkstoffe Korrosion (Weinheim/Bergstr.), v. 20, no. 9, Sep. 1969 p 762-772

(Contract NASw-2483)

(NASA-TT-F-15994) Avail: NTIS HC $3.75 CSCL 11F

The steels of types X5 CrNiMoTi 25 25 and X5 CrNi 18 9 are compared with respect to their behavior in the sensitized state, and the corrosion properties are discussed from the standpoint of the chromium depletion theory. Author

N75-10212# Joint Publications Research Service, Arlington, Va.

ELECTROSLAG REMELTING

B. Ye. Paton, ed. 17 Oct. 1974 86 p refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 86 p

(JPRS-63220) Avail: NTIS HC $4.75

Mathematical and physical aspects of electroslag refining, the structure of electroslag ingots, and a system for cooling crystallizers are reported. For individual titles, see N75-10213 through N75-10224.

N75-10213 Joint Publications Research Service, Arlington, Va. **SOME CHARACTERISTICS OF THE THERMAL OPERATION OF AN ELECTROSLAG REMELTING FURNACE CRYSTALLIZER WITH A BROADENED SLAG TOP** **c31**

G. S. Marinskiy, B. I. Medovar, V. M. Baglay, B. B. Fedorovskiy, and V. I. Us *In its* Electroslag Remelting (JPRS-63220) 17 Oct. 1974 p 1-5 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 46-49 (For availability see N75-10212 01-26)

Disposition of the layer of the liquid metal on the horizontal surface of a crystallizer, located under the remeltable electrode, permits a significant reduction of the thermal load on this surface in a three phase EShP furnace. With a thickness of the metal layer of 15-20 mm and a thickness of the hardened slag layer under it of 2-3 mm, the heat flux on the horizontal surface decreases 1.5 to 2 times compared to that of the unprotected vertical wall. The presence of a metal layer on the greater part of the horizontal surface protects this surface against erosion. Author

N75-10214 Joint Publications Research Service, Arlington, Va. **INDIRECT DETERMINATION OF SPECIFIC HEAT FLUXES IN THE CRYSTALLIZER WALL DURING EShP** **c77**

G. S. Marinskiy, B. B. Fedorovskiy, V. M. Gaglay, and V. I. Us *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 6-7 Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 50-51 (For availability see N75-10212 01-26)

Investigations were carried out at IES on simultaneous smelting of two ingots in a crystallizer with a common slag bath is studied. The crystallizer consists of the slag top and two indentical molding devices. The crystallizer elements have their own cooling with individual inputs and discharge of the cooling water. The water temperature at the input and output and the water flow rates through the cooling systems of the crystallizer elements were measured during the course of remelting. Moreover, the level of the metal in the crystallizer and the shape of the metal bath were determined at the end of melting. Author

N75-10215 Joint Publications Research Service, Arlington, Va. **ELECTROSLAG REMELTING DURING PRODUCTION OF SHEET STEEL** **c31**

B. Ye. Paton, B. I. Medovar, and G. E. Tsukanov *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 8-17 Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 51-61 (For availability see N75-10212 01-26)

Electroslag remelting is the most efficient method of obtaining sheet and slab ingots for further conversion to rolled sheet steel of especially high quality. The method can be used to produce rectangular sheet ingots with flat sides for rolling on slabbing mills and with convex narrow sides for conversion on blooming mills, and to obtain sheet ingots and also slab ingots with any ratio of linear dimensions: height, thickness and width. Author

N75-10216 Joint Publications Research Service, Arlington, Va. **ELECTROSLAG REMELTING IN MULTIPASS CRYSTALLIZERS** **c31**

B. Ye. Paton, B. I. Medovar, V. L. Artamonov, A. G. Bogachenko, and V. M. Baglay *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 18-25 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 62-68 (For availability see N75-10212 01-26)

Several methods of multipass electroslag melting, including two pass melting of slab ingots for producing sheets (7) and four pass melting of square section ingots, have been developed. A modernized furnace of type was used to obtain four ingots simultaneously with a cross section of 150 x 150 mm. Modernization of the furnace included equipping it with a new drive mechanism for the lower car, a four pass crystallizer and a crucible stool automatic level system for the metal and slag bath and a system for controlling the motion of the crystallizer, and also a special interchangeable electrode holder. Slight reequipping of the short system makes it possible to use both bifilar and single phase schemes on this furnace. Author

N75-10217 Joint Publications Research Service, Arlington, Va. **PROSPECTS OF MANUFACTURING CRANKSHAFTS FOR SHIP'S DIESELS BY THE ELECTROSLAG CASTING METHOD** **c31**

B. Ye. Paton, B. I. Medovar, and G. A. Boyko *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 26-31 Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 69-75 (For availability see N75-10212 01-26)

The three dimensional crankshaft billet is shaped without using forging press equipment by employing the electroslag process. This may be carried out by several variants of technology, the simplest of which are two variants consisting of the following. A consumable electrode is melted in a crystallizer, having the shape of the crankshaft pin arm and equipped with two openings, corresponding in shape to the dimensions of the crankpin and crank journal. Previously melted cylindrical hollow or solid

ingots -- pin billets, installed in the corresponding openings of the crystallizer, are fused to it during melting of the crank arm by forming a single monolithic body. To melt the second arm of the crank, the first billet is installed with respect to the crystallizer such that one of the fused pins enters its opening, while the pin is installed in the other opening. By melting the second arm of the crank, the pin and first billet are simultaneously fused to it. Author

N75-10218 Joint Publications Research Service, Arlington, Va.
USE OF ELECTROSLAG TECHNIQUE IN MANUFACTURE OF COLD-ROLLERS **c31**
B. Ye. Paton, B. I. Medovar, L. M. Stupak, V. M. Baglay, V. I. Us, and B. B. Fedorovskiy *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 32-38 Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 75-84 (For availability see N75-10212 01-26)

Methods affecting crystallization of the metal for dispersion of the primary structure with respect to manufacture of large one piece rollers by the EShP method are considered. The electromagnetic effect on the crystallizer metal and also purging of the metal bath with gases and gaspowder mixtures are described. Optimum compositions of steels are being investigated for manufacturing of composite rollers to provide a favorable combination of maximum hardness and wear resistance with satisfactory viscosity. Author

N75-10219 Joint Publications Research Service, Arlington, Va.
ELECTROSLAG SMELTING OF LARGE-SIZE HOLLOW BILLETS **c31**
B. I. Medovar, L. V. Chekotilo, and V. L. Pavlov *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 39-44 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 84-90 (For availability see N75-10212 01-26)

Quality hollow billets of practically any dimensions can be obtained by the fusing method based on EShP. The high quality of the metal permits the use of hollow EShP billets not only for conversion but in cast form without deformation. The new method of electroslag smelting of hollow billets should preferably be used in single and small series manufacture. Author

N75-10220 Joint Publications Research Service, Arlington, Va.
SOME CHARACTERISTICS OF EShP OF METAL IN CONSUMABLE CRYSTALLIZERS **c20**
B. I. Medovar, Yu. G. Yemelyanenko, D. A. Kozlitin, Yu. A. Sterenbogen, N. A. Tsvyashchenko, I. N. Khoroshko, and A. I. Borovko *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 96-100 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 96-100 (For availability see N75-10212 01-26)

A mathematical model and a computer program are developed to calculate the temperature field of the smelted ingot and the crystallizer wall. The model of the thermal processes during EShP in consumable crystallizers takes into account some characteristic features of the given process, the conditions of heat transfer of the ingot from the surrounding medium, and also the nature of the melting of the crystallizer wall. The model is used primarily to calculate the line of melting of the wall of the consumable crystallizer and to predict the temperature field in heavier ingots. Author

N75-10221 Joint Publications Research Service, Arlington, Va.
MECHANISM OF FORMATION OF CORRUGATIONS ON THE SURFACE OF ELECTROSLAG INGOTS
Yu. G. Yemelyanenko *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 51-53 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 100-102 (For availability see N75-10212 01-26)

A smooth and even surface is typical for electroslag ingots. At the same time cases are encountered when the surfaces ingots are affected by corrugations or distortions. The cause of these defects may be a momentary sharp reduction of power in the slag bath or remelting in an electric mold known to be cold. In the first case the corrugations are singular and are accompanied by rough crystallization layers in the macrostructure of the ingots, which considerably worsens the physico-mechanical and service-operational properties of the metal. In the second case the corrugations are numerous and are a special surface defect which does not effect the macrostructure of the ingots. Numerous corrugations are frequently found on large electrode slag ingots and are results of attempts to minimize the depth of the metal bath to reduce the development of liquation phenomena. Author

N75-10222 Joint Publications Research Service, Arlington, Va.
INVESTIGATING THE QUALITY OF WELDED ELECTROSLAG JOINTS OF ROTORS 1500 MM IN DIAMETER OF 25(KHN3MF) STEEL OF ELECTROSLAG AND ELECTROFURNACE SMELTING **c39**
B. I. Medovar, V. P. Andreyev, V. V. Kosyan, A. N. Sevruk, Yu. G. Yemelyanenko, V. V. Chernykh, Yu. V. Sobolev, A. I. Shavrin, and E. Yu. Kolpishon *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 54-62 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 109-118 (For availability see N75-10212 01-26)

Results of investigating the welded joints of billets 1200 and 1500 mm in diameter show that, despite the almost twofold increase of area of the welded billets, the new method of EShS by the bifilar scheme provides high and valuable qualitative characteristics. High quality welded joints are obtained during the welding of electroslag billets of practically unlimited dimensions. The high mechanical properties of large size billets, obtained by the electroslag technique, make it valid to pose the question of using cast undeformed metal to manufacture generators and turbine rotors as well as the billets of other crucial assemblies. Author

N75-10223 Joint Publications Research Service, Arlington, Va.
USING EShP TO OBTAIN CAST ELECTROSLAG FORGING BILLETS **c31**
G. A. Boyko, V. S. Grinyuk, V. M. Shneyberg, and N. A. Tsvetkov *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 63-67 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 138-142 (For availability see N75-10212 01-26)

The results of experimental industrial tests show convincingly that the use of cast electroslag die billets makes it possible to increase the strength of the die attachment, manufactured from the most modern high strength brands of steels 1.5 to 2 times, under operating conditions on highly productive presses and on the most recent automatic presses. Extensive introduction of cast electroslag die billets into industry provides a large saving. Author

N75-10224 Joint Publications Research Service, Arlington, Va.
CLASSIFICATION AND BASES OF MATHEMATICAL DESCRIPTION OF METALLURGICAL PROCESSES OF REFINING LIQUID METAL **c31**
B. Ye. Paton and A. L. Tikhonovskiy *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 68-82 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 150-162 (For availability see N75-10212 01-26)

The metallurgical processes of refining liquid metal can be divided into kinetic and quasi-equilibrium by the nature of the course of the chemical reaction in time. Mathematical description of the kinetics of the metallurgical process can be represented by the equation of material balance in which the rate of refining is equal to the algebraic sum of the indicated fluxes. The efficiency of refining is reduced during transition from the kinetic to the quasi-equilibrium metallurgical process, where the greater the degree, the higher the degree of refining achieved in this case. An increase of the number of stages of the quasi-equilibrium metallurgical process raises the efficiency of refining. Author

N75-10225*# Battelle Columbus Labs., Ohio.
SINGLE CRYSTALS OF METAL SOLID SOLUTIONS Final Report
J. F. Miller, A. E. Austin, N. Richard, N. M. Griesenauer, D. P. Moak, M. R. Mehrabian, and S. H. Gelles 3 Sep. 1974 53 p refs
(Contract NAS8-29875)
(NASA-CR-120511) Avail: NTIS HC $4.25 CSCL 11F

The following definitions were sought in the research on single crystals of metal solid solutions: (1) the influence of convection and/or gravity present during crystallization on the substructure of a metal solid solution; (2) the influence of a

magnetic field applied during crystallization on the substructure of a metal solid solution; and (3) requirements for a space flight experiment to verify the results. Growth conditions for the selected silver-zinc alloy system are described, along with pertinent technical and experimental details of the project. A.A.D.

N75-10226# Grumman Aerospace Corp., Bethpage, N.Y. Research Dept.
THERMOELASTIC HEAT EFFECTS IN EQUIATOMIC NiTi
David J. Larson, Jr. Sep. 1974 18 p refs
(RM-592) Avail: NTIS HC $3.25

Thermomechanical and thermodynamic results are shown. It is also shown that the heat and temperature of transformation both increase with increased strain. It is found that the conversion of the thermal martensitic array to a strain martensite array occurs locally during stage 1 deformation, in polycrystalline samples, but may occur in a macroscopically coordinated band in heavily textured material. Thermally cycling thermoelastic martensites through the transformation lowers both the transformation temperature and heat of transformation, and the lowest value should be considered the heat of transformation of the thermal martensite. Author

N75-10227# Aeronautical Research Labs., Melbourne (Australia).
RELATIONSHIP BETWEEN MICROSTRUCTURE AND FRACTURE TOUGHNESS IN D6ac STEEL
N. E. Ryan Apr. 1974 22 p refs
(ARL/Met-Note-103) Avail: NTIS HC $3.25

The plane strain fracture toughness of materials is discussed from the standpoint of application to design and inspection purposes, the assessment of critical crack lengths, and the establishment of maximum applied stress levels. The effects of variations in heat treatment on tensile properties and fracture toughness were determined and the structural changes associated with the various heat treatments are examined. Attention is directed towards structural variations in steels having similar ultimate strengths but different fracture toughness. Author

N75-10228# Sandia Labs., Albuquerque, N.Mex.
QUANTITATIVE ANALYSIS OF THE INFLUENCE OF CONTAMINANTS ON THERMOCOMPRESSION BONDING OF GOLD
P. H. Holloway Mar. 1974 27 p refs
(Contract AT(29-1)-789)
(SLA-73-1099) Avail: NTIS HC $3.75

Surface chemical analyses by Auger electron spectroscopy (AES) indicate that oxide films and hydrocarbon residues are the most frequent contaminants on gold hybrid microcircuit metallization. AES data in conjunction with lead frame bonding data demonstrate that 5 A of chromium oxide can degrade thermocompression bond strengths. The primary electron beam for AES cracks the hydrocarbon contaminants causing a carbonaceous residue. Lead frame bonding data demonstrated that a 10 A thick carbon residue was indicative of thermocompression bond degradation. Author (NSA)

N75-10229# California Univ., Livermore. Lawrence Livermore Lab.
INFLUENCE OF THERMOMECHANICAL TREATMENT ON THE TENSILE PROPERTIES OF A PLATINUM 25 wt PERCENT IRIDIUM ALLOY
R. J. Foley, G. S. Root, J. R. Hauber, D. P. Moak, and W. H. Pfeifer 24 Apr. 1974 18 p refs
(UCRL-75630) Avail: NTIS HC $3.25

Platinum is significantly strengthened by alloying with iridium. When an application requiring high strength at room temperature arose, a Pt-25 wt% Ir alloy was chosen as a good compromise of strength and workability. The alloy was synthesized by consumable arc melting, hot worked at 1343 C, tensile tested at room temperature, and subjected to chemical analysis, metallographic examination, and limited hardness determinations. The tensile tests were first made under two different conditions of cold work following a water quench from the hot work temperature. An absence of work hardening and a significant reduction in yield strength with increasing cold work were found. Adding an aging step of 5 hr at 700 C, strength increases. Subsequent cold work showed another decrease in strength, and reaging restored the strength and provided the highest strength levels. Author (NSA)

N75-10230# California Univ., Livermore. Lawrence Livermore Lab.
LOW TEMPERATURE THERMOPHYSICAL AND MECHANICAL PROPERTIES OF HIGH PURITY PLATINUM-25 w/o IRIDIUM ALLOY
R. J. Foley and F. J. Jelinek 28 Feb. 1974 8 p refs Presented at the 5th Intern. Cryogenic Eng. Conf., Kyoto, 7 May 1974 Sponsored by AEC
(UCRL-75278; Conf-740509-3) Avail: NTIS HC $3.25

The low temperature properties of a platinum-25 w/o iridium alloy were evaluated in the temperature range of 4 K to 300 K. The high purity material was synthesized, by consumable arc melting and subjected to a series of cold work and aging operations to obtain a high strength, machinable alloy. Values are presented for the thermal contraction and thermal conductivity between 4 K and 300 K. These measurements were performed using fused silica dilatometry and longitudinal steady state methods, respectively. Mechanical strength data are reported at 20 K and 300 K. In all cases, the material used was 50% cold worked and aged at 973 K for five hours. Author (NSA)

N75-10231# Cornell Univ., Ithaca, N.Y. Dept. of Materials Science and Engineering.
HYDROGEN BRITTLENESS IN HYDROGEN AND HYDROGEN-OXYGEN GAS MIXTURES
H. H. Johnson 1973 31 p refs Presented at the Intern. Conf. on stress Corrosion Cracking and Hydrogen Embrittlement of Iron Base Alloys, Unieux-Firminy, France, 10 Jun. 1973
(Contract AT(11-1)-3166)
(COO-3166-6; Conf-730605-3) Avail: NTIS HC $3.75

Crack initiation and propagation characteristics are presented for high strength steels in hydrogen and hydrogen-oxygen mixtures under both static and cyclic stress. Under static stress and in hydrogen the threshold stress intensity for crack initiation was nearly independent of temperature in the range around 300K; however, the crack growth rate was a maximum near 300K and decreased at both higher and lower temperatures. Oxygen in the amount of 0.4% by volume eliminated hydrogen-induced slow crack growth; at lower concentrations the threshold stress intensity was approximately linear with oxygen concentration. Under cyclic stress hydrogen-accelerated fatigue crack growth was observed for 4340 steel with yield strengths from 150 to 215 KSI. Oxygen additions eliminated the hydrogen-accelerated growth at the lower strength levels, but was only partially inhibitory at a yield strength of 215 KSI. Author (NSA)

N75-10232# California Univ., Los Angeles. School of Engineering and Applied Science.
PARTICLE SIZE DISTRIBUTION EFFECTS IN PRECIPITATION HARDENING Annual Progress Report, 1 Jan. 1973 - 15 Jan. 1974
A. J. Ardell Feb. 1974 49 p refs
(Contract AT(04-3)-34)
(UCLA-34-P-172-11; APR-5) Avail: NTIS HC $3.75

Single-crystal specimens of a Ni-6 wt% Al alloy were mechanically tested in compression at room temperature after aging for various times at 625 C. The critical resolved shear stress (CRSS) was measured and analyzed as a function of average particle size according to the predictions of the theory of precipitation hardening of ordered coherent precipitates presented by Brown and Ham. Agreement with theory appears to be excellent. The effect of the standard deviation of the particle size distribution on the CRSS appears to be that broadening the distribution tends to lower the CRSS. Single-crystal specimens of a Ni-7.53 wt% Al alloy were doubly aged (first at 800 C for 32 h, then at 600 C for various times) to produce bimodal distributions of precipitates. The aging response of the doubly aged samples is more rapid than when the same alloy is isothermally aged at 600 C. Author (NSA)

N75-10233# Sandia Corp., Albuquerque, N.Mex.
HYDROGEN IN METALS: A NEW THEORETICAL MODEL
A. C. Switendick 1973 12 p refs Presented at the Hydrogen Econ. Miami Energy Conf., Miami Beach, Fla., 18 Mar. 1974 Sponsored by AEC

(SLA-73-5810; Conf-740306-4) Avail: NTIS HC $3.25

Calculations for cubic metal hydride structures have shown the factors contributing to stable hydride formation. Hydrogen perturbs a certain class of electronic states strongly, namely those associated with s-like character at the hydrogen site. The calculations enable determination of these states and their energy position and relate the stability of various hydride structures to the hydrogen locations and spacing, thus indicating a maximum hydrogen density. The implication of these results to the solubility of hydrogen in metals is discussed.

Author (NSA)

N75-10234# European Space Research Organization, Paris (France).

INVESTIGATION ON THE INFLUENCE OF TEMPERATURE AND SPECIMEN GEOMETRY ON THE FRACTURE TOUGHNESS PROPERTIES OF TiAl6V4

Karl-Heinz Galda Jun. 1974 124 p refs Transl. into ENGLISH of Untersuch. ueber den Einfluss von Temperatur u. Probengeometrie auf die bruchmechanischen Kennwerte von TiAl6V4, DLR-FB-73-107, DFVLR, 4 Sep. 1973

(ESRO-TT-75; DLR-FB-73-107) Avail: NTIS HC $5.25; DFVLR, Porz, West Ger. 40.40 DM

The influence of temperature in the range from minus 196 C to room temperature, and specimen geometry in the range from plane strain to plane stress state was investigated. The crack opening stretch at the crack tip was optically determined and discussed as a fracture criterion. Crack toughness decreases with decreasing temperature, but at minus 120 C the condition shows a maximum, with values greater than those at room temperature, depending on the microstructure (equi-axed to lamellar). The crack opening stretch at the first stable crack advance is independent of specimen thickness (2 mm to 14 mm) and crack length (a/W = 0.29 to 0.65) at room temperature. The critical crack opening stretch was found to be 9 micron. The first crack advance stress intensity factors which are not so influenced by structure as the crack toughness are calculable.

Author (ESRO)

N75-10235# European Space Research Organization, Paris (France).

INFLUENCE OF GAS PARTICLES ADSORBED ON THE SOLID SURFACE AND INFLUENCE OF STRUCTURE ON THE GAS-SOLID INTERACTION MEASURED BY MOLECULAR BEAM SCATTER

Dirk Jaeger Sep. 1974 91 p refs Transl. into ENGLISH of Einfluss von an der Oberflaeche adsorbierten Gasteilchen u. Einfluss von Struktur auf die Gas-Festkoerper-Wechselwirkung, gemessen an der Molekularstrahlstreuung, DLR-FB-73-14, DFVLR, 3 Jan. 1973

(ESRO-TT-84; DLR-FB-73-14) Avail: NTIS HC $4.75; DFVLR, Porz, West Ger. 27.20 DM

The reflection intensities of a thermal molecular beam (A,Kr) on various solid bodies (Cu, Fe, Ti, Co, Al2O3) were measured in respect of angle of incidence, temperature of the solid body, and the composition of the adsorbable gases. It is possible to show connections between the intensity distribution of the reflected molecular beam as a measure for the gas-solid interaction, the degree of coverage of the surface with adsorbed gases, the average gain diameter, and the plasticity of the solid body. The results were compared with experimental and theoretical results.

Author (ESRO)

N75-10236# Illinois Inst. of Tech., Chicago.

THE MOBILITY OF COINCIDENCE AND NEAR COINCIDENCE GRAIN BOUNDARIES Final Report, 1 Sep. 1969 - 28 Feb. 1974

Geoffrey T. Higgins and Paul Gordon Jul. 1974 8 p refs

(Grant DA-ARO(D)-31-124-G1148)

(AD-782908; AROD-7996-3-MC) Avail: NTIS CSCL 11/6

The report summarizes the results and conclusions of a study of; (1) single boundary migration in zone refined cadmium, (2) the analysis of grain growth and single boundary migration data and (3) the mathematical approach to the specification of coincident site relationships. The publications and oral presentations that have resulted from the work are listed. Author (GRA)

N75-10237# Army Foreign Science and Technology Center, Charlottesville, Va.

SELECTION OF COMPOSITION AND HEAT TREATMENT OF CAST MAGNETIC ALLOYS

A. A. Zabolotskii 3 May 1974 6 p refs Transl. into ENGLISH from the monograph "Osnovy Obrazovaniya Liteinykh Splavov" Moscow p 340-343

(AD-783765; FSTC-HT-23-2372-72) Avail: NTIS CSCL 11/6

There are at present only two alloys - YuNDK24 and YuNDK35T5 (Co-Ti-Fe-Al-Cu-Ni-Nb) with high magnetic energy. The problem of making new alloys with magnetic properties is discussed. The composition of starting alloys, necessary heat treatment, and magnetic properties of obtained alloys are described. The effect of the content of Ni and Co, as well as of heat treatment on the magnetic properties of new alloys is also discussed.

GRA

N75-10238# National Bureau of Standards, Washington, D.C. Inst. for Materials Research.

THERMODYNAMICS OF CHEMICAL SPECIES IMPORTANT TO ROCKET TECHNOLOGY Final Report, Jan. - Jun. 1973

Thomas B. Douglas and Charles W. Beckett 1 Jul. 1973 123 p refs

(Grant AF-AFOSR-0001-73; AF Proj. 9750)

(AD-782028; NBSIR-73-281; AFOSR-74-0063TR) Avail: NTIS CSCL 07/4

Using a subsecond-duration transient technique, the specific heat, electrical resistivity, and hemispherical total emittance were simultaneously measured over the temperature range 1500-2800K for iron and for the alloy 80 Nb-10 Ta-10 W. The work on iron demonstrates the feasibility of applying a rapid-pulse heating technique to solid-solid transformations. Melting points (and normal spectral emittance for 650 nm at the melting point) were found. Preliminary values are reported for the first time for the standard heat of formation and a vapor pressure of the subfluoride of molybdenum MoF5. A new static method for measuring small vapor pressures has reproduced known values for I2 and MoF6 to within 1%. The vapor pressure of MoF5 (l) thus measured at 393K, when compared with the earlier transpiration result for this temperature, indicates that the saturated vapor contains about 85 or 90 mole % of the monomer species, depending on the method of interpretation. (Modified author abstract)

GRA

N75-10239# Battelle Columbus Labs., Ohio.

RESEARCH ON SYNTHESIS OF HIGH-STRENGTH ALUMINUM ALLOYS. PART 2: CONTROL OF GRAIN STRUCTURE DURING HOT WORKING Final Report, 1 Jul. 1971 - 30 Apr. 1974

Dean N. Williams Aug. 1974 69 p refs

(Contract F33615-71-C-1805)

(AD-783353; AFML-TR-129-Pt-2) Avail: NTIS CSCL 11/6

The effects of deformation parameters on the tendency of 2024 aluminum alloy to recrystallize either during hot working or during subsequent solution heat treatment were examined. Samples were upset under controlled conditions in the Gleeble programmed thermal-mechanical test machine. The behavior of homogenized 2024 was compared with that of a high purity Al-4.6Cu alloy and with cast 2024 and 2124. Based on the Gleeble results, hot rolling procedures were designed for producing a fine equiaxed grain structure in sheet rolled from either homogenized 2024 or cast 2124. A limited quantity of sheet was rolled according to these procedures and evaluated to determine tensile and fatigue properties.

Author (GRA)

N75-10240# Naval Postgraduate School, Monterey, Calif.

HIGH TEMPERATURE TEXTURE STRENGTHENING IN ALPHA-TITANIUM M.S. Thesis

Robert William Rolfes Jun. 1974 50 p refs

(AD-784213) Avail: NTIS CSCL 11/6

The high-temperature texture strengthening behavior of alpha-titanium has been investigated over a wide range of temperatures (.30 to .55Tm) and strain rates (.0166 to 0.00-00154/sec). The activation energy for creep, was found to be 80% higher than the accepted value for self-diffusion. Cross-rolling samples with a subsequent anneal produced a strong duplex texture. Textured transverse samples were consistently stronger than longitudinal samples, with a 40% difference in strength at

the lowest creep rates and in the temperature range most useful for titanium (300 500C). Author (GRA)

N75-10241# Battelle Columbus Labs., Ohio.
AN ATOMIC MODEL OF AN ENVIRONMENTALLY-AFFECTED CRACK IN BCC IRON
A. J. Markworth, M. F. Kanninen, and P. C. Gehlen Jul. 1974 33 p refs Presented at the Intern. Conf. on Stress Corrosion Cracking and Hydrogen Embrittlement of Iron Base Alloys, Unieux-Firminy, France, 10-16 Jun. 1973
(Contract N00014-70-C-0390)
(AD-783725; TR-20) Avail: NTIS CSCL 11/6

Results of atomistic calculations of the effects of hydrogen on crack propagation in bcc iron are presented. The iron-iron interaction is represented by the Johnson interatomic potential, whereas the hydrogen-iron potential is based on results obtained by Walker, et al., using many-body perturbation theory. The effect of the hydrogen is to shorten the distances between the four iron atoms surrounding it. As a result, other adjacent iron-iron bonds are elongated and finally break, one at a time, at a load that is about 10% smaller than the normal failure load in alpha-iron. Author (GRA)

N75-10242# Army Foreign Science and Technology Center, Charlottesville, Va.
EFFECT OF ELECTRON IRRADIATION ON MECHANICAL PROPERTIES AND STRUCTURE OF ALUMINUM
G. G. Bondarenko and L. I. Ivanov 13 May 1974 11 p refs Transl. into ENGLISH from Fiz. Khim. Obrabotki Mater. (USSR), no. 6, 1972 p 47-50
(AD-784321; FSTC-HT-23-29-74) Avail: NTIS CSCL 11/6

Samples of aluminum of varying degrees of purity (99.9 and 99.99%) were irradiated with 2.3 MeV electrons at room temperature. The irradiation rate was 1 x 10 to the 14th power electron/sq cm x sec and the dose range (2.5-7.2) x 10 to the 18th power electron/sq cm. Tensile strength testing of the irradiated samples showed a noticeable change in mechanical properties of the aluminum (99.9%). This change is connected with the discovery of accumulations of point defects in these samples, which were effective stops to movement of dislocations. GRA

N75-10243# Battelle Columbus Labs., Ohio.
ATOMIC CRACK SIMULATION IN FRACTURE MECHANICS
P. C. Gehlen, G. T. Hahn, and M. F. Kanninen Jul. 1974 9 p refs Presented at the 3rd Intern. Conf. on Fracture, Munich, 8-13 Apr. 1973
(Contract N00014-70-C-0390)
(AD-783724; TR-19) Avail: NTIS CSCL 11/6

Using computer simulation, the authors have attempted to relate the macroscopic fracture properties of bcc iron to phenomena on the atomic scale. Although bonds can be made to rupture in the computer model (brittle fracture), the predicted cleavage plane is the (100) plane. This discrepancy is attributed to the approximations made in the flexible boundary. Author (GRA)

N75-10244# Battelle Columbus Labs., Ohio.
THE INTERACTION BETWEEN LINE FORCE ARRAYS AND PLANAR CRACKS
J. P. Hirth, R. G. Hoagland, and P. C. Gehlen Jul. 1974 18 p refs Prepared in cooperation with Ohio State Univ.
(Contract N00014-70-C-0390)
(AD-783704; TR-21) Avail: NTIS CSCL 11/6

The utility of line force fields in computer simulations of lattice defects is discussed. These fields are shown to provide a facile method for introducing realistic flexible boundary conditions on simulated atomic crystallites. The pertinent elastic fields for line force arrays lying parallel to the tip of a planar crack are presented. The method has been successfully applied to a study of hydrogen embrittlement of alpha-iron. The usage of this type technique is particularly important in the case where nonequilibrium phenomena--such as unstable crack growth--are studied. (Modified author abstract) GRA

N75-10245# Army Foreign Science and Technology Center, Charlottesville, Va.
SUPERPLASTICITY OF STEEL KH18N10T
O. A. Kaibyshev and E. G. Gordienko 3 Jun. 1974 6 p refs Transl. into ENGLISH from Metalloved. Term. Obrab. Metal. (USSR), no. 4, 1973 p 66-67
(AD-784175; FSTC-HT-23-277-74) Avail: NTIS CSCL 11/6

The possibility of producing superplasticity in single-phase alloys through creation of fine-grain structure in them by preliminary heat treatment was investigated. GRA

N75-10246# Pennsylvania State Univ., University Park. Dept. of Materials Science.
DIFFUSION STUDIES IN NONMETALLIC SYSTEM, PART 1 Final Report, 1 May 1970 - 30 Apr. 1974
V. S. Stubican and W. J. Minford Aug. 1974 52 p refs
(Contract N00014-67-A-0385-0011; NR Proj. 032-525)
(AD-784437) Avail: NTIS CSCL 02/12

The rate of formation of NiAl2O4 by reaction between single crystals of NiO and Al2O3 is described. In NiO the behavior of the diffusion coefficient as a function of concentration supports the Lidiard theory of diffusion by impurity-vacancy pairs. The free energy of association for pairs was calculated. The interdiffusion coefficients in the spinel showed a constant small increase with the increase of the aluminum ions dissolved in the spinel. The mechanism of the interdiffusion in systems AO-B2O3 is discussed. The experimental data obtained on interdiffusion of B(3+) ions (e.g. Cr(3+) and AL(3+) in an AO compound (e.g. MgO and NiO) implies that no association of defects occurs. This relationship was observed in systems Cr2O3-MgO and Cr2O3-NiO at temperatures higher than 1300C. From interdiffusion studies the activation energy of motion for B(3+) ions can be obtained. GRA

N75-10247# Denver Univ., Colo.
SURFACE STRUCTURE AND APPLIED STRESS IN CORROSION RATE Final Report, 1 Jun. 1971 - 31 May 1974
Malcom T. Hepworth and Kirit J. Bhansali 30 Jun. 1974 82 p refs
(Grants DA-ARO(D)-31-124-71-G144;
DA-ARO(D)-31-124-74-G173)
(AD-783402; AROD-9075-3-MC) Avail: NTIS CSCL 11/6

A device was built that permits the detection and location of the local potential fields set up by local action currents in the solution adjacent to a corroding metal surface. These potentials are measured and correlated to the local action current for developing pits on type 304 stainless steel samples anodically polarized to the pitting range in 2% NaCl solutions. This correlation was obtained by integrating the peak potentials with time and plotting the integrated values against corresponding pit volume. A linear correlation was obtained over a range where pits were small enough that no secondary pits were observed in the vicinity. A chemical analysis of surfaces in and around pits indicated slective dissolution of Ni during the early growth of pits. Atomic absorption analysis of the test solutions was in agreement with the chemical analysis of the sample surfaces. (Modified author abstract) GRA

N75-10248# Martin Marietta Labs., Baltimore, Md.
FURTHER OBSERVATIONS ON THE EFFECT OF GRAIN BOUNDARY SEGREGATION IN THE HYDROGEN EMBRITTLEMENT OF NICKEL Interim Technical Report
R. M. Latanision and H. Opperhauser, Jr. Jul. 1974 11 p refs
(Contract N00014-74-C-0279; NR Proj. 036-087)
(AD-783103; MML-TR-74-17C) Avail: NTIS CSCL 11/6

Earlier work has shown an association between the intergranular embrittlement of nickel by hydrogen and the presence of hydrogen recombination poisons at the grain boundaries. The present effort demonstrates that the susceptibility of nickel to embrittlement may be controlled by heat treatment sequences which affect the partitioning of impurities. It is also suggested that the association between impurities and microchemistry may apply in part as well as to the temper embrittlement of steels. Author (GRA)

N75-10249# Cincinnati Univ., Ohio.
DEHYDRIDING OF TITANIUM ALLOY (Ti-6246) HYDRIDED POWDER Final Report, Mar. - Oct. 1973

N. Birla and Vincent DePierre Jun. 1974 34 p refs Sponsored by AFML
(AF Proj. 7351)
(AD-783235; AFML-TR-74-31) Avail: NTIS CSCL 11/6

A systematic investigation of temperature pressure - time variables for dehydriding titanium alloy (Ti-6246) powder was made to determine practical processing conditions for reducing the hydrogen content of the powder to levels below 100 ppm. Analyses of the experimental results of tests made between 1200F and 1500F indicate that 1500F is the optimum dehydriding temperature. The controlling process for dehydriding can be expressed by second order reaction 2H(gas) = H2 (gas) with an activation energy of 21,760 plus or minus 1840 cal. Below 0.088 micron partial pressure of hydrogen, the type of vacuum system used for dehydriding is believed to be the major factor for removal of these molecules. Author (GRA)

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N75-10250 Michigan State Univ., East Lansing.
AN ANALYSIS OF THE SPECTRAL DISTRIBUTION OF LIGHT QUASI-ELASTICALLY SCATTERED FROM HIGH MOLECULAR WEIGHT POLYMER SOLUTIONS IN THE LOWER CRITICAL TEMPERATURE REGION Ph.D. Thesis
Sisto Nicholas Stiso 1974 10131 p
Avail: Univ. Microfilms Order No. 74-19877

The spectral distribution of light elastically scattered from high molecular weight polymer solutions was measured, and the dependence of the power spectrum on temperature and scattering angle determined. The frequency resolution required for these measurements was provided by light-beating spectroscopic techniques. Spectra obtained for polymer solutions in the lower critical temperature region exhibited good fit to a single Lorentzian curve. Moderate deviations were observed at temperatures close to the critical point and at scattering angles greater than 45 deg. Dissert. Abstr.

N75-10251*# Kentucky Univ., Lexington. Dept. of Metallurgical Engineering and Materials Science.
MECHANICAL BEHAVIOR OF POLYCRYSTALLINE CERAMICS: BRITTLE FRACTURE OF SiC-Si3N4 MATERIALS Final Report
Martin H. Leipold, Cawas M. Kapadia, and Anant H. Kelkar Aug. 1974 57 p refs
(Grant NGL-18-001-042)
(NASA-CR-134732; UKY-TR84-74-MET19) Avail: NTIS HC $4.25 CSCL 11D

The first study area involved magnesium oxide and the role of anion impurities, while the second area was directed toward slow crack growth in silicon nitride-silicon carbide ceramics. The oxide program involved development of fabrication techniques for anion doped materials and evaluation of the role of these anions in the hot pressing response, grain boundary diffusion of nickel doped material, grain boundary microhardness, and grain growth. Author

N75-10252*# Kanner (Leo) Associates, Redwood City, Calif.
CARBON-FIBER-REINFORCED POLYMERS AND THEIR THERMAL DECOMPOSITION TO CARBON-CARBON COMPOSITIES Ph.D. Thesis
A. Buerger Washington NASA Oct. 1974 149 p refs Transl. into ENGLISH of "Kohlenstoffaser-verstaerkte Polymere and deren thermischer Abbau bis zu Kohlenstoff/Kohlenstoff Verbundwerkstoffen" Ph.D. Thesis, Karlsruhe Univ., 1973 193 p
(Contract NASw-2481)
(NASA-TT-F-15990) Avail: NTIS HC $5.75 CSCL 11D

Carbon-fiber-reinforced composites with polymeric matrix were developed for applications at higher temperatures. The procedure involved a hardening of the material and a complete thermal decomposition leading to pure carbon. The chemical modification of conventional laminating resins was considered together with the application of new high-temperature resistant polymers, and the thermal processing of polymers. Unreinforced polymeric matrices and the preparation and testing of unidirectional fiber-reinforced composites are studied. Author

N75-10253# California Univ., Livermore. Lawrence Livermore Lab.
TENSILE PROPERTIES OF AN ULTRAHIGH-STRENGTH GRAPHITE FIBER IN AN EPOXY MATRIX
T. T. Chiao, M. A. Hamstad, and E. S. Jessop 12 Dec. 1973 15 p refs Presented at the Conf. on Composite Reliability, Las Vegas, Nevada, Sponsored by AEC 15-16 Apr. 1974
(UCRL-75209) Avail: NTIS HC $3.25

The fiber performance and potential as a reinforcement for fiber composites of a special PAN-based graphite fiber were evaluated by testing the fiber's tensile properties in an epoxy matrix. Representative strand samples were taken from 30 spools of single end, 1500 filament fiber to make over 5000 fiber/epoxy strand specimens using the filament winding process. Characteristics studied were fiber uniformity, strength and modulus distributions at room and liquid nitrogen temperatures, stress-strain behavior, the effect of strain rate on fiber strength, and acoustic emission during tensile loading to failure. Liquid nitrogen temperature and various strain rates had no significant effect on fiber tensile properties. Author (NSA)

N75-10254# Unilever Research, Vlaardingen (Netherlands).
THE INFLUENCE OF SURFACTANTS ON THE ADHESION BETWEEN SOLIDS
F. vanVoorstVader and H. Dekker [1974] 32 p refs Revised Submitted for publication
Avail: NTIS HC $3.75

The force of adhesion between crossed carbon filaments submerged in an aqueous buffer solution was measured. The decrease of this force, observed on addition of surfactants (cetyltrimethyl ammonium bromide or decylsulphonic acid) to the solution, is in agreement with that predicted by the thermodynamic theory of adhesion. A relation between the force of adhesion and the filaments and their wetting properties was derived and is supported by the experiments. It is concluded that adhesion in the above systems can be described by thermodynamics. Author (ESRO)

N75-10255# Westinghouse Research Labs., Pittsburgh, Pa. Metallurgy and Metals Processing Dept.
EFFECT OF SELECTED IMPURITIES ON THE HIGH TEMPERATURE MECHANICAL PROPERTIES OF HOT-PRESSED SILICON NITRIDE Final Report
J. L. Iskoe and F. F. Lange 5 Apr. 1974 16 p refs
(Contract N00014-68-C-0323)
(AD-783506; Rept-74-9D4-KERAM-R2) Avail: NTIS CSCL 11/2

Additions of CaO to high purity beta-Si3N4, which was hot-pressed to full density with the aid of MgO, was found to significantly influence the high temperature mechanical properties. Other impurity additions, viz., Al2O3, Fe2O3, Li2CO3 and Na2CO3, had no effect. Author (GRA)

N75-10256# Battelle Columbus Labs., Ohio.
REDUCTION OF ERRORS IN CERAMIC BEND TESTS
R. G. Hoagland, C. W. Marschall, and W. H. Duckworth Jul. 1974 28 p refs Presented at the Ann. Meeting of the Am. Ceram. Soc. 76th, Chicago, 29 Apr. 1974
(Contract N00014-73-C-0408; NR Proj. 032-541)
(AD-784435; TR-1) Avail: NTIS CSCL 11/2

Mechanical tests of most ceramics are subject to stringent requirements, more so than tests of materials which possess some ability to undergo plastic deformation. In this paper, sources of stress concentrations and spurious displacements which may be imposed during four-point bend tests of ceramic materials are identified and discussed. Particular areas of concern involve unequal moments at the loading points, twisting due to skewness of the contact lines, wedging stresses at point contacts, and counter moments produced by friction at the loading point-specimen interface. A bend fixture incorporating design features to significantly reduce these effects is described and results of measurements of the surface stresses in calibration specimens under load in the fixture are presented. Author (GRA)

N75-10257# Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
NOVEL MATERIALS FOR POWER SYSTEMS. PART 2: INVESTIGATIONS OF PROTON SEMI-CONDUCTING GLASSES Annual Technical Report, 1 Jun. 1973 - 31 May 1974
C. A. Angell 15 Jul. 1974 57 p refs
(Grant DAHC15-73-G-0011; ARPA Order 2338)
(AD-784448) Avail: NTIS CSCL 07/4

The phenomenon of unusually large electrical conductivity in glasses formed by the cooling of certain aqueous solutions of strong protonic acids has been investigated with the object of (1) establishing that the origin of the excess conductivity lies in the high mobility of protons in the glassy structure, and (2) determining the states of protons responsible for the phenomenon and examining the relation of the operative conductance mechanism to that oxide glass with mobile alkali metal cations. D.C. conductivity studies confirmed the protonic origin of the conductance, but showed also that the phenomenon was limited to glasses with relatively high glass transition temperatures. NMR and IR spectral studies showed that excess (acid) protons exchanged rapidly with water protons on the NMR time scale although two distinct proton environments are observed in the shorter time scale IR spectra. Conductivity relaxation studies were unable to find any basic differences in the electrical field response characteristics between the protonic conductors and the silicate glass ionic conductors. Author (GRA)

N75-10258# Ceramic Finishing Co., State College, Pa. 11/2
COMPARISONS OF FRACTURE MIRRORS IN FLINT GLASS FRACTURED UNDER VARIOUS LOADING CONDITIONS
Henry P. Kirchner and William A. Sotter May 1974 56 p refs
(Contract N00014-74-C-0241; NR Proj. 032-545)
(AD-784489; TR-1) Avail: NTIS

Fracture mirrors formed in as received, annealed and quenched flint glass rods fractured under normal strength measurement and impact loading rates were compared. The objectives of the investigation were to determine the effect of methods of mirror measurement, loading conditions and residual stresses on fracture mirror size and shape and to demonstrate the usefulness of mirror measurements for estimating the fracture stresses in glass specimens when other means of estimating the stresses were not available. GRA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N75-10259# Committee on Commerce (U. S. Senate).
LIMIT LEAD IN GASOLINE
Washington GPO 1974 110 p refs Hearing before Subcomm. on Environment of Comm. on Commerce, 93d Congr., 1st Sess., 29 Nov. 1973
(GPO-29-660) Avail: Subcomm. on Environment

A Congressional investigation was conducted to determine the validity of the requests from the Environmental Protective agency to limit the amount of lead which could be added to gasoline for motor vehicle use. The economic factors, pollution problem, and product availability are discussed. Testimony is provided by selected witnesses concerning the harmful physical effects of lead in gasoline. Charts are provided to show the production capacity of unleaded fuels and the anticipated demand for the product. Author

N75-10260# California Univ., Livermore. Lawrence Livermore Lab.
CRITICAL ENERGY FOR SHOCK INITIATION OF TETRYL AND A-5
L. G. Green, E. J. Nidick, Jr., and F. E. Walker 14 Mar. 1974 13 p refs
(Contract W-7405-eng-48)
(UCID-16469) Avail: NTIS HC $3.25

Results of shock initiation experiments on tetryl and A-5 are presented. A gun system was used to produce both sustained and short duration pressure pulses from which the critical energy for initiation for these explosives was calculated. For tetryl, the value was 420 + or - 24 kJ/sq m. For A-5 the value was 528 + or - 26 kJ/sq m. Author (NSA)

N75-10261# Sandia Corp., Albuquerque, N.Mex.
METHODOLOGY FOR COMPUTATION OF INTERFACE PARAMETERS OF A HOT-WIRE EXPLOSIVE DEVICE FROM THE ELECTROTHERMAL RESPONSE ANALOG
A. C. Strasburg Apr. 1974 29 p refs
(Contract AT(29-1)-789)
(SLA-73-1034) Avail: NTIS HC $3.75

The transient pulse test for determining bridgewire interface parameters of a hot-wire explosive device produces an analog of resistance change as a function of time in response to a square wave electrical signal. Previously used approaches to interpretation of this analog have been based on establishing an electrical equivalent or graphical balance. A procedure has been devised to interpret the response signal using relatively simple electronic data processing equipment. The analog is reduced to mathematical expressions representing the initial and final states of the primary time constant. These expressions, together with test equipment calibration and variables data, allow direct computation of component parameters. The technique will facilitate development of a test data system requiring a minimum of operator effort and interpretation in data reduction.
Author (NSA)

N75-10262# European Space Research Organization, Paris (France).
THEORETICAL PERFORMANCE OF ORGANIC POLYMERS IN HYBRID ENGINES WITH HYDROGEN PEROXIDE AS OXIDIZER
Helmut Weiler Aug. 1973 34 p refs Transl. into ENGLISH of Theoretische Leistungen von Kunststoffen in lithergolen Treibstoffkombinationen mit Wasserstoffperoxid als Oxydator, DLR-Mitt-73-26, DFVLR, 13 Aug. 1973
(ESRO-TT-94; DLR-Mitt-73-26) Avail: NTIS HC $3.75; DFVLR, Porz, West Ger. 13.20 DM

Specific impulse, data of the combustion gases, and effects of lower hydrogen peroxide concentrations for some organic polymer, fuels in combination with hydrogen peroxide as oxidizer at a chamber pressure of 69 and 9.8 bar and different expansion ratios were determined. Author (ESRO)

N75-10263# European Space Research Organization, Paris (France).
ABOUT THE USE OF LITHIUM-CONTAINING PROPELLANTS IN ROCKET PROPULSION UNITS WITH FLOX AS OXIDIZER. PART 1: PARAMETER STUDY
Helmut Weiler and H. Lips 7 Jan. 1974 29 p refs Transl. into ENGLISH of Ueber die Verwendung lithiumhaltiger Brennstoffe in Raketentriebwerken mit FLOX als Oxydator. Teil 1: Parameterstudie, DLR-FB-74-07, DFVLR, 7 Jan. 1974
(ESRO-TT-87; DLR-FB-74-07) Avail: NTIS HC $3.25; DFVLR, Porz, West Ger. 11.60 DM

The normally low combustion efficiency of the Li/F2/ system can be increased by a partial replacement of lithium with polymers. The influence of polymers on the performance of this system was investigated. In this investigation the hydrogen/carbon ratio and the heat of formation were varied. Additional criteria important for application such as propellant density, corrosion and molding characteristics, combustion temperature, and changes in combustion, and changes in combustion efficiency with increasing lithium content were considered. Author (ESRO)

N75-10264# Aerojet Solid Propulsion Co., Sacramento, Calif. Service Engineering Div.
ASYMMETRIC GRAIN EVALUATION COMPUTER PROGRAM Final Report
28 Jun. 1974 16 p refs
(Contract DAAH01-74-C-0434)
(AD-784350; ASPC-1163-FR-1) Avail: NTIS CSCL 21/9

An existing computer program was modified to provide capability of evaluating the effects of solid propellant grain design

asymmetrics caused by mandrel misalignment, and chamber bow or ovality. The computer code performs the necessary calculations to describe the regression history of an arbitrary singly perforated grain design. Modifications to the computer code consisted of adding supplemental subroutines to generalize the calculation scheme and to provide a plot display of grain periphery as a function of burn distance. A major effort was expended to define the respective grain and chamber wall periphery during a motor tailoff sequence. (Modified author abstract) GRA

N75-10265# Atlantic Research Corp., Alexandria, Va.
SPECTROSCOPIC STUDY OF METAL VAPOR KINETICS Final Technical Report, May 1973 - Apr. 1974
Andrej Macek, P. J. Goede, R. S. Scheffee, and P. P. Zukovich Apr. 1974 55 p refs
(Contract F30602-73-C-0313; ARPA Order 1649)
(AD-783275; RADC-TR-74-184) Avail: NTIS CSCL 19/1

The purpose of this project was the formulation and evaluation of pyrotechnic mixtures for release of aluminum and iron vapors. In the program which is the subject of the present report, WO3, Zr, Al, Fe, and Fe2O3 powders were mixed in different proportions, pressed into strands with masses of 15 to 25 gm, and burned mostly at subatmospheric pressure. This type of release is based on the fact that metallic Al (or Fe) is the most volatile component among the flame products of any given formulation, so the product gas will consist predominantly of Al (or Fe) vapor; the detailed thermodynamics is discussed. The performance of the mixtures was judged by (a) qualitative observation of the plumes recorded by a movie camera; (b) burning-time, hence average linear burning-rate, measurement; and (c) quantitative absorption spectroscopy of Al and Fe vapors. Details of the two absorption-spectroscopy methods used are presented. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N75-10266*# National Bureau of Standards, Boulder, Colo. Cryogenics Div.
PRELIMINARY HYDROGEN FREEZING STUDIES Final Report
D. E. Daney, W. G. Steward, and R. O. Voth Oct. 1973 281 p refs Sponsored by NASA
(NASA-CR-140605; NBSIR-73-339) Avail: NTIS HC $8.75 CSCL 20/12

The development and technology required to fill space vehicle propellant tanks with solid hydrogen by in-place freezing is reported. The program was to have been carried out in two phases: a mathematical analysis, and experimental verification of the analysis. Freezing times and heat flux was calculated for four geometrical shapes and a range of sizes, refrigerant temperatures, ortho-para concentrations, and heat transfer coefficients. The results of these calculations are presented in generalized graphical form, in a total of 240 graphs. The freezing experimental apparatus was built and a preliminary test was performed which generally demonstrates the validity of the analytical and experimental approaches. With only minor modifications the apparatus is ready for a full test program of hydrogen freezing and melting techniques. Author

N75-10267# Bureau of Mines, Rolla, Mo. Metallurgy Research Center.
RECYCLING OF PLASTICS FROM URBAN AND INDUSTRIAL REFUSE
J. L. Holman, J. B. Stephenson, and M. J. Adam 1974 49 p refs
(BM-RI-7955) Avail: NTIS HC $3.75

Waste plastic concentrates from a local collection drive, recycling center collections, urban refuse pilot plants, and the secondary metals industry were separated into three major thermoplastic families 1-em polyolefins, styrenes, and vinyls 1-em based on differences in density using a sink-float-elutriation hydraulic separator. Other separation methods and systems such as air classification, jigging, liquid media, screening, and electrostatics were studied. A characterization study conducted on eight chopped wire insulation wastes from secondary copper and aluminum processors showed that most wastes contained 2 percent to 7 percent residual metal and large percentages of vinyl. The residual metal content of some of these wastes was lowered to 0.1 percent and the vinyl portion segregated using various separation techniques. The research also suggests ways in which reclaimed thermoplastics may be fabricated into useful products. Author

N75-10268# Bendix Corp., Kansas City, Mo.
VIBRATORY DEBURRING Final Report
L. K. Gillespie Jan. 1974 103 p refs Revised
(Contract AT(39-1)-613)
(BDX-613-735-Rev) Avail: NTIS HC $5.25

The operation of small precision mechanisms such as timers, switches, or actuators depends on burr-free sharp-edged component parts. Traditional methods of producing these near-perfect edges on miniature parts are costly and not as precise or repeatable as some piecepart designs require. Vibratory deburring is capable of producing burr-free sharp edges on some miniature metal components; this investigation was initiated to determine the limitations and repeatability of the process and its effects on subsequent operations. This study concluded that the process can produce burr-free edges with edge radii of 0.003 plus or minus 0.0015 inch on some materials; that smaller edge breaks or radii are not feasible on most parts; that suitability of the process is dependent upon piecepart geometry; and that the process can produce residual contamination on the workpiece that could be detrimental to subsequent operations, such as welding or plating. Author (NSA)

N75-10269# Bendix Corp., Kansas City, Mo.
AUTOMATED SCHEDULING OF MANUFACTURING RESOURCES Technological Spinoff Report
W. G. Hoppen Mar. 1974 26 p refs
(Contract AT(29-1)-613)
(BDX-613-1077) Avail: NTIS HC $3.75

To effectively utilize manpower, equipment, and facilities in production, two major factors must be known: the current inprocess status of product and the required date for the finished product. By automatically computing production and inspection hours and comparing the results to required dates and resource capacities, it is possible to provide a daily priority plan for every production load center. The automated process characterizations and control techniques are given that provide a five-day finite plan for 100 percent of the capacity of each load center in a manufacturing operation producing mechanical and electronic assemblies under contract for the U. S. Government and involving approximately 13,000 active part numbers. Author (NSA)

N75-10270# Bendix Corp., Kansas City, Mo.
MECHANICAL DEBURRING OF PLASTICS
R. J. Hishaw Jan. 1974 33 p Revised
(Contract AT(29-1)-613)
(BDX-613-988-Rev) Avail: NTIS HC $3.75

Hand deburring has been used to remove mold flash and machining burrs from relatively small parts molded from both thermosetting and thermoplastic resins. In an effort to reduce the time and manpower required for deburring, abrasive blast, flame, tumble, vibratory, slurry, putty extrusion, explosive, and cryogenic deburring were studied. Abrasive blasting was found to be the most efficacious and to have the broadest application. Tumble and vibratory deburring are effective on burrs on external surfaces. Author (NSA)

N75-10271# Bureau of Mines, Washington, D.C.
TECHNOLOGIC AND RELATED TRENDS IN THE MINERAL INDUSTRIES, 1973 Information Circular
Jun. 1973 58 p
(PB-233997/6; BM-IC-8643) Avail: NTIS Avail: SOD HC $0.95 as I28.27:8643 CSCL 08I

Recent trends and developments in the minerals industry are outlined. Discussed are new methods, equipment, techniques, and systems used to more effectively extract and process mineral products. Environmental considerations, health and safety standards, price controls, inflation, material shortages, and more

dependence on foreign imports were problems faced by the minerals industry. Although productivity increased for most mineral commodities, the annual rate of increase has slowed in recent years, indicating a maturing technological situation. Growing concern for energy resulted in increased interest and research in alternative fuel sources. The primary concerns of metallurgists were pollution control and improved efficiency and performance of metallurgical processes, especially for reduction of energy consumption. GRA

N75-10272*# Columbia Univ., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM Progress Report, 1 Jul. 1973 - 30 Jun. 1974
Sven R. Hartmann and William Happer 30 Jun. 1974 160 p refs
(Grant NGR-33-008-191; Contract DAAB07-69-C-0383; Grant AF-AFOSR-2180-72; AF-AFOSR-2685-74; NSF GH-38503; DA Proj. 200-61102-B-31F)
(NASA-CR-140678; AD-783915; CU-6-74-0383; PR-24) Avail: NTIS HC $6.25 CSCL 07/4

The report discusses completed and proposed research in atomic and molecular physics conducted at the Columbia Radiation Laboratory from July 1972 to June 1973. Central topics described include the atomic spectra and electronic structure of alkali metals and helium, molecular microwave spectroscopy, the resonance physics of photon echoes in some solid state systems (including Raman echoes, superradiance, and two photon absorption), and liquid helium superfluidity. GRA

N75-10273# National Materials Advisory Board, Washington, D.C.
A SEMI-DELPHI EXERCISE ON FLUORSPAR AND MANGANESE IN STEELMAKING Final Report
Jul. 1974 68 p
(Contract GS-OO-DS-(P)-94008)
(NMAB-317) Avail: NTIS HC $4.25

The purpose of the exercise was to identify possible technical opportunities that could reduce the requirements for fluorspar and manganese as fluxes in the steelmaking process. The information was collected by first summarizing a single iteration of questions, followed by a workshop that focussed on specific substitutes. Alternatives to fluorspar and manganese as fluxes are presented. Author

N75-10213 Joint Publications Research Service, Arlington, Va.
SOME CHARACTERISTICS OF THE THERMAL OPERATION OF AN ELECTROSLAG REMELTING FURNACE CRYSTALLIZER WITH A BROADENED SLAG TOP
G. S. Marinskiy, B. I. Medovar, V. M. Baglay, B. B. Fedorovskiy, and V. I. Us *In its* Electroslag Remelting (JPRS-63220) 17 Oct. 1974 p 1-5 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 46-49 (For availability see N75-10212 01-26)

N75-10215 Joint Publications Research Service, Arlington, Va.
ELECTROSLAG REMELTING DURING PRODUCTION OF SHEET STEEL
B. Ye. Paton, B. I. Medovar, and G. E. Tsukanov *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 8-17 Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 51-61 (For availability see N75-10212 01-26)

N75-10216 Joint Publications Research Service, Arlington, Va.
ELECTROSLAG REMELTING IN MULTIPASS CRYSTALLIZERS
B. Ye. Paton, B. I. Medovar, V. L. Artamonov, A. G. Bogachenko, and V. M. Baglay *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 18-25 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 62-68 (For availability see N75-10212 01-26)

N75-10217 Joint Publications Research Service, Arlington, Va.
PROSPECTS OF MANUFACTURING CRANKSHAFTS FOR SHIP'S DIESELS BY THE ELECTROSLAG CASTING METHOD
B. Ye. Paton, B. I. Medovar, and G. A. Boyko *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 26-31 Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 69-75 (For availability see N75-10212 01-26)

N75-10218 Joint Publications Research Service, Arlington, Va.
USE OF ELECTROSLAG TECHNIQUE IN MANUFACTURE OF COLD-ROLLERS
B. Ye. Paton, B. I. Medovar, L. M. Stupak, V. M. Baglay, V. I. Us, and B. B. Fedorovskiy *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 32-38 Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 75-84 (For availability see N75-10212 01-26)

N75-10219 Joint Publications Research Service, Arlington, Va.
ELECTROSLAG SMELTING OF LARGE-SIZE HOLLOW BILLETS
B. I. Medovar, L. V. Chekotilo, and V. L. Pavlov *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 39-44 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 84-90 (For availability see N75-10212 01-26)

N75-10223 Joint Publications Research Service, Arlington, Va.
USING EShP TO OBTAIN CAST ELECTROSLAG FORGING BILLETS
G. A. Boyko, V. S. Grinyuk, V. M. Shneyberg, and N. A. Tsvetkov *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 63-67 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 138-142 (For availability see N75-10212 01-26)

N75-10224 Joint Publications Research Service, Arlington, Va.
CLASSIFICATION AND BASES OF MATHEMATICAL DESCRIPTION OF METALLURGICAL PROCESSES OF REFINING LIQUID METAL
B. Ye. Paton and A. L. Tikhonovskiy *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 68-82 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 150-162 (For availability see N75-10212 01-26)

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N75-10274 British Broadcasting Corp., Kingswood (England). Research Dept.
ARRAYS OF UHF LOG-PERIODIC AERIALS: A VERTICALLY-POLARISED RECEIVING AERIAL FOR RE-BROADCAST LINKS
G. H. Millard and J. L. Riley Sep. 1974 8 p refs
(BBC-RD-1974/30) Avail: BBC, Kingwood Warren, Tadworth, Surrey, England

The aerial array described comprises four uhf ruggedized log-periodic aerials and is suitable for vertically-polarized reception at some r.b. sites. The uhf bands 4 and 5 are covered by two versions, differing in dimensions only. The impedance match to 50 ohms and the horizontal radiation pattern sidelobe level meet the specification. The average effective gain, taking into account the losses associated with the distribution transformer and interconnecting leads is about 12-5 db. Author

N75-10275 British Broadcasting Corp., Kingswood (England). Research Dept.
UHF AMPLIFIERS: IMPROVEMENT OF LINEARITY BY PRE-CORRECTION
A. G. Lyner and P. Shelswell Sep. 1974 11 p
(BBC-RD-1974/32) Avail: BBC, Kingswood Warren, Tapworth, Surrey, England

The basic principle of pre-correction for improving amplifier linearity is discussed with some theory and the idea of pre-correction using an error signal injection system is introduced. A description is given of a practical form of pre-corrector which was used successfully to double the output power of a transistor

amplifier for a UHF television combined sound and vision signal. Author

N75-10276 Soviet Radio, Moscow (USSR).
THEORETICAL PRINCIPLES OF STATISTICAL RADIOTECHNOLOGY, BOOK 1
B. R. Levin 1974 555 p refs In RUSSIAN
Copyright. Avail: Issuing Activity

The theoretical principles of statistical radiotechnology are treated in terms of the problems of probability analysis. Topics discussed include probability theory and the theory of random processes, analysis of function transformations of random processes in a radio circuit, selection theory, the study of energy spectra of impulse processes, and processes which simulate random processes. Author

N75-10277 Arizona Univ., Tucson.
MULTIPATH COMPENSATION OF A DQPSK COMMUNICATION LINK Ph.D. Thesis
Thomas Randall Hooton 1974 147 p
Avail: Univ. Microfilms Order No. 74-20135

Based on the signal space concept of orthogonality it is shown herein that an optimum signal for communication through a strong multipath environment is a signal orthogonal to time delayed versions of itself. A sub-optimum but realizable modulation technique called FSK-DQPSK is analyzed. Essentially the technique consists of stepping the DQPSK carrier frequency through a known sequence of closely spaced frequencies, so chosen as to be orthogonal to one another. The performance characteristics of FSK-DQPSK are evaluated. Specifically, the FSK-DQPSK technique will cause an increase in the transmitted spectrum's width, an increase in the receiver lock time, and a significant improvement in the receiver's performance in strong random multipath. The FSK-DQPSK modulation technique is demonstrated to be a sort of in-channel frequency diversity which can be implemented by relatively minor modifications to the basic DQPSK transmitter and receiver. Dissert. Abstr.

N75-10278 Georgia Inst. of Tech., Atlanta.
DESIGN OF DIGITAL MOVING TARGET INDICATION RADAR PROCESSORS Ph.D. Thesis
George Watkins Ewell, III 1974 149 p
Avail: Univ. Microfilms Order No. 74-21566

This dissertation develops design procedures for improved MTI (Moving Target Indication) radar processors for systems utilizing PRF's (Pulse Repetition Frequencies) which are either constant or varying. Improved design procedures which utilize the flexibility and capability of modern radar systems are described. Classes of staggered PRF processors have been developed; the Maximum Improvement Processors (MIP's), and the Constrained Improvement Processors (CIP's). Representative CIP's are compared with earlier processors, and a considerable improvement in uniformity of frequency response is achieved with a CIP. Dissert. Abstr.

N75-10279 George Washington Univ., Washington, D.C.
THEORETICAL SOLUTIONS TO PROBLEMS INTRODUCED BY THE TWA IN MULTIPLE ACCESS COMMUNICATION SYSTEMS Ph.D. Thesis
David William Walsh 1974 157 p
Avail: Univ. Microfilms Order No. 74-22553

The problems of signal distortion introduced by the nonlinearity of the traveling wave amplifier (TWA) in multiple access communication systems is investigated. The effects of amplifier nonlinearity are determined for systems employing a range of multiple access techniques from multicarrier frequency division (FDMA) to single-carrier time division (TDMA). Theoretical solutions to these problems based on the ability to control TWA nonlinearity by means of the inherent design characteristics of the slow wave structure are evaluated. The ability to control the nonlinear effects of the TWA by means of variations in the basic frequency and spatial characteristics of the slow wave structure are evaluated. Dissert. Abstr.

N75-10280# Australian Post Office Research Labs., Melbourne.
EARTH STATIONS FOR SATELLITE COMMUNICATIONS
R. K. Flavin Jan. 1974 54 p refs
(Rept-6866) Avail: NTIS HC $4.25

Several factors important in the design of satellite earth stations are discussed from a techno-economic point of view. A large Intelsat type earth station is broken down into its various subsystems to illustrate the many possible building blocks that might be used in a smaller earth station. A cost minimization analysis is presented which predicts the optimum combination of antenna, transmitter and receiver. Different earth station designs, suitable for an Australian national satellite system, are subjected to the cost minimization analysis to show their optimum configuration. Author

N75-10281*# ESL, Inc., Sunnyvale, Calif.
MAJOR RFI CONDITIONS EFFECTING TDRSS Interim Report
James D. Lyttle 15 Aug. 1974 39 p refs
(Contract NAS5-20406)
(NASA-CR-139135; ESL-TM494; IR-4) Avail: NTIS HC $3.75 CSCL 17B

An evaluation of the radio frequency interference (RFI) conditions which would affect operating frequency band selections and data communications equipment design approaches for the Tracking Data Relay Satellite System (TDRSS) is presented. The subjects discussed are: (1) the scope of the investigation, (2) relative RFI in the frequency bands considered, (3) radar RFI power and duty factor, (4) radio relay communications RFI, (5) radio frequency band usage recommendations, and (6) radar RFI impact areas. Author

N75-10282*# ESL, Inc., Sunnyvale, Calif.
THE EFFECT OF RADIO FREQUENCY INTERFERENCE ON THE 136- TO 138-MHz RETURN LINK AND 400.5- TO 401.5-MHz FORWARD LINK OF THE TRACKING AND DATA RELAY SATELLITE SYSTEM
J. Jenny and J. D. Lyttle 1 Mar. 1973 36 p
(Contract NAS5-20406)
(NASA-CR-139136; ESL-TM362) Avail: NTIS HC $3.75 CSCL 17B

The purpose is to update the RFI estimates in the 136- to 138-MHz VHF band and to make estimates for the first time for the 400.5- to 401.5-MHz UHF band. These preliminary predictions are based on primarily ITU frequency-registration data, with missing data bridged by engineering judgement. Author

N75-10283*# Environmental Research Inst. of Michigan, Ann Arbor.
SIMULTANEOUS DUAL-BAND RADAR DEVELOPMENT Final Report, Jul. 1972 - Apr. 1973
Charles L. Liskow Sep. 1974 60 p refs
(Contract NAS9-12967)
(NASA-CR-140303; ERIM-195100-1-F) Avail: NTIS HC $4.25 CSCL 17I

Efforts to design and construct an airborne imaging radar operating simultaneously at L band and X band with an all-inertial navigation system in order to form a dual-band radar system are described. The areas of development include duplex transmitters, receivers, and recorders, a control module, motion compensation for both bands, and adaptation of a commercial inertial navigation system. Installation of the system in the aircraft and flight tests are described. Circuit diagrams, performance figures, and some radar images are presented. Author

N75-10284*# RCA Service Co., Inc., Springfield, Va. Government Services Operations.
IN-HARBOR AND AT-SEA ELECTROMAGNETIC COMPATIBILITY SURVEY FOR MARITIME SATELLITE L-BAND SHIPBOARD TERMINAL
Aug. 1974 157 p refs
(Contract NAS5-24035)
(NASA-CR-139131) Avail: NTIS HC $6.25 CSCL 17B

Geostationary maritime satellites, one over the Pacific and one over the Atlantic Ocean, are planned to make available high-speed communications and navigation (position determination) services to ships at sea. A shipboard satellite terminal, operating within the authorized maritime L-band, 1636.5 to 1645.0 MHz, will allow ships to pass voice, teletype, facimile, and data messages to shore communication facilities with a high degree of reliability. The shore-to-ship link will also operate in the maritime L-band from 1535.0 to 1543.5 MHz. A significant

number or maritime/commercial ships are expected to be equipped with an L-band satellite terminal by the year 1980, and so consequently, there is an interest in determining electromagnetic compatibility between the proposed L-band shipboard terminal and existing, on-board, shipboard communications/electronics and electrical systems, as well as determining the influence of shore-based interference sources. The shipboard electromagnetic interference survey described was conducted on-board the United States Line's American Leader class (15,690 tons) commercial container ship, the 'American Alliance' from June 16 to 20, 1974. Details of the test plan and measurements are given. Author

N75-10285*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RELATION BETWEEN METRIC AND DECAMETRIC NOISE STORM SOURCES AND MICROWAVE S-COMPONENT EMISSIONS
Kunitomo Sakurai Sep. 1974 13 p refs Submitted for publication
(NASA-TM-X-70764; X-693-74-267) Avail: NTIS HC $3.25 CSCL 17B

Various activities are reported by taking into account the properties of the active region and its relationship to low frequency burst emissions observed by the IMP-6 satellite. The relation of metric noise continuum storms (200 MHz) with the S-component of microwave emissions (2800 MHz) are examined. Taking the results analyzed, a model on the growth of radio noise continuum sources in metric and decametric frequencies and its relation to microwave and other solar active phenomena are considered. M.C.F.

N75-10286*# RCA Service Co., Inc., Springfield, Va. Government Services Operations.
EMC TEST PLAN FOR SHIPBOARD IN-HARBOR AND AT-SEA MEASUREMENTS FOR L-BAND TERMINAL
12 Jun. 1974 41 p
(Contract NAS5-24035)
(NASA-CR-139130) Avail: NTIS HC $3.75 CSCL 17B

This test plan is to provide a procedure for the measurement of on-board radio frequency interference resulting from the operation of on-board radars (S-Band and X-Band). Field intensity measurements in the range of 1 to 10 GHz will be made using calibrated test instrumentation to determine possible adverse effects to the operation of the future installation of a Maritime L-Band Shipboard Satellite Communications Terminal, for use with the ATS-F and MARISAT Communications Satellites. A measurement will be made of power line conducted interference to determine the degree of power line isolation that may be required. There is also consideration of interference to the radars by the proposed L-Band terminals and observations will be made of the radar displays while L-Band transmitter operation is simulated. These tests will be made aboard the American Alliance container ship, United States Lines. Author

N75-10287*# ESL, Inc., Sunnyvale, Calif.
PRELIMINARY ASSESSMENT OF RFI IMPACTS ON TDRSS IN THE 2- TO 2.3 GHz BAND Interim Report
J. D. Lyttle 10 May 1974 40 p
(Contract NAS5-20406)
(NASA-CR-139125; ESL-TM406; IR-2) Avail: NTIS HC $3.75 CSCL 17B

A study was conducted of the radio frequency bands and radio frequency interference (RFI) impacts on the TDR satellite. Quick look evaluations were performed on RFI conditions in the 136 to 138 MHz and 400.5 to 401.5 MHz bands. An approximate chronological account of the investigations and the intermediate findings are presented. The preliminary results of RFI evaluations in the nominally 2 to 2.3 GHz band. An analysis of the time interaction of user satellites with microwave radio-relay type communications beams as a source of RFI is included. Author

N75-10288*# McDonnell-Douglas Astronautics Co., St. Louis, Mo. Advanced Electronic Techniques Dept.
DEVELOPMENT OF A WIDEBAND PULSE QUATERNARY MODULATION SYSTEM Final Report, 28 Jun. 1973 - 28 Jan. 1974
J. A. Federhofer May 1974 54 p
(Contract NAS5-23248)
(NASA-CR-139129) Avail: NTIS HC $4.25 CSCL 17B

Laboratory data verifying the pulse quaternary modulation (PQM) theoretical predictions is presented. The first laboratory PQM laser communication system was successfully fabricated, integrated, tested and demonstrated. System bit error rate tests were performed and, in general, indicated approximately a 2 db degradation from the theoretically predicted results. These tests indicated that no gross errors were made in the initial theoretical analysis of PQM. The relative ease with which the entire PQM laboratory system was integrated and tested indicates that PQM is a viable candidate modulation scheme for an operational 400 Mbps baseband laser communication system. Author

N75-10289*# Computer Sciences Corp., Falls Church, Va. Advanced Networks Section.
TDRSS DATA HANDLING AND MANAGEMENT SYSTEM STUDY. GROUND STATION SYSTEMS FOR DATA HANDLING AND RELAY SATELLITE CONTROL Final Report, Dec. 1972 - Jul. 1973
Aug. 1973 251 p
(Contract NAS5-22148)
(NASA-CR-139128; R-4192-02) Avail: NTIS HC $8.50 CSCL 05B

Results of a two-phase study of the (Data Handling and Management System DHMS) are presented. An original baseline DHMS is described. Its estimated costs are presented in detail. The DHMS automates the Tracking and Data Relay Satellite System (TDRSS) ground station's functions and handles both the forward and return link user and relay satellite data passing through the station. Direction of the DHMS is effected via a TDRSS Operations Control Central (OCC) that is remotely located. A composite ground station system, a modified DHMS (MDHMS), was conceptually developed. The MDHMS performs both the DHMS and OCC functions. Configurations and costs are presented for systems using minicomputers and midicomputers. It is concluded that a MDHMS should be configured with a combination of the two computer types. The midicomputers provide the system's organizational direction and computational power, and the minicomputers (or interface processors) perform repetitive data handling functions that relieve the midicomputers of these burdensome tasks. Author

N75-10290# Sandia Labs., Albuquerque, N.Mex.
AIRCRAFT-VELOCITY MEASUREMENT THROUGH RADAR-ALTIMETER ECHO WITH NONCOHERENT DETECTION
C. S. Williams Mar. 1974 48 p refs
(Contract AT(29-1)-789)
(SLA-74-112) Avail: NTIS HC $3.75

The accuracy of a method of measuring aircraft velocity through the use of the echo received by a radar altimeter is discussed, with attention to the effect of square-law detection. A formula was derived which sets a low enough upper limit for the calculation of maximum allowable integration time 2T. The effect of pulse was also considered, where both the leading antenna and the trailing antenna transmit and receive the same wave. The device is described which transmits downward and receives upward the echo from the terrain. Author

N75-10291# Computer Sciences Corp., Falls Church, Va.
ACCESS CONTROL AND PROCESSING STUDIES FOR GROUND SATELLITE MOBILE COMMUNICATIONS/SURVEILLANCE SYSTEMS Final Report, Jan. - Dec. 1973
John J. Bisaga, Howard A. Blank, and Alan J. Brown Jun. 1974 173 p refs Sponsored in part by FAA
(Contract DOT-TSC-565)
(AD-784380; FAA-RD-74-106; TSC-FAA-74-18) Avail: NTIS CSCL 17/7

The report synthesizes a set of satellite communications systems configurations to provide services to aircraft flying oceanic routes. These configurations are combined with access control methods to form complete systems. These systems are analyzed using a simulation and their performance is presented in terms of avionics complexity and cost, queueing delays, pilot workload, and operational considerations. A preferred system is selected and recommendations are made. Author (GRA)

N75-10292# European Space Research Organization, Paris (France).
REAL-TIME MEASURING PROCEDURE AND MEASURING EQUIPMENT FOR RECORDING THE RADIATION PATTERNS OF AIRCRAFT ANTENNAS IN FLIGHT
Ulrich Hinzpeter, H. Mattes et al Jun. 1974 58 p refs Transl. into ENGLISH of Real-Time-Messverfahren u. -Messanlage zur Flugvermessung der Strahlungsdiagramme von Flugzeugbordantennen, DLR-FB-73-97, DFVLR, 6 Aug. 1973
(ESRO-TT-74; DLR-FB-73-97) Avail: NTIS HC $4.25; DFVLR, Porz, West Ger. 24.90 DM

A new measuring procedure to obtain immediate recordings of the radiation patterns of aircraft antennas while under test in actual flying conditions is described. This real time measuring procedure replaces older methods that have become uneconomic because of the high demands made on personnel, time, and equipment. The new procedure has already proved itself in the course of several antenna measurements. Previously used measuring methods are briefly described and discussed.
Author (ESRO)

N75-10293# Ohio State Univ., Columbus. ElectroScience Lab.
TARGET IDENTIFICATION BY MEANS OF LOW FREQUENCY RADAR RETURNS
Y. T. Lin and A. A. Ksienski May 1974 107 p refs
(Grant AF-AFOSR-1710-69; AF Proj. 1710-69)
(AD-783224; ESL-2768-12; AFOSR-74-1197TR) Avail: NTIS CSCL 17/9

A target identification technique is presented. It is based on low frequency radar returns. A large variety of objects is shown to be reliably classified in the presence of substantial amounts of noise. The target complexity varies form cylinders and cubes to modern combat airplanes. Two classification algorithms are used and compared, a linear discriminant method and a nearest neighbor rule. Both multiclass and pairwise classifications are carried out and extensively illustrated. The majority of results presented involve only the amplitudes of the radar returns, but the last part of the report describes the very impressive effects of phase on classification performance. Author (GRA)

N75-10294# Army Foreign Science and Technology Center, Charlottesville, Va.
DIGITAL MODELING IN STATISTICAL RADIO ENGINEERING
V. V. Bykov 26 Oct. 1973 278 p refs Transl. into ENGLISH of the monograph "Tsifrovoe Modelirovanie v Statisticheskoi Radiotekhnike" Moscow, 1971 328 p
(AD-783732; FSTC-HT-23-1784-73) Avail: NTIS CSCL 17/2

Mathematical methods for modeling processes common in radio systems are developed for use with multi-purpose digital computers. Efficient algorithms are constructed for digital modeling of radio signals and noise as well as a wide range of random processes. The modeling of random vectors and non-stationary and Markov processes are discussed. Models of random process are considered according to distribution law and within the framework of correlation theory. The modeling of signals and noise as they pass through linear and nonlinear systems are well covered. The principal criteria used in evaluating algorithms are accuracy and the efficient use of computer time. Several applications of digital modeling to statistical radio engineering problems are examined. GRA

N75-10295# IIT Research Inst., Chicago, Ill.
VEHICULAR VARIABLE-PARAMETER METRRA SYSTEM Final Report and Instruction Manual
R. F. Elsner May 1974 231 p refs
(Contract DAAK02-72-C-0197)
(AD-782214; ITTRI-E6224) Avail: NTIS CSCL 17/9

The report and instruction manual is intended to describe the Variable Parameter Metal Re-Radiating Radar (METRRA) System (hereafter designated as the VP METRRA), depict its performance, and provide operating and maintenance instructions. A METRRA system differs from conventional radar primarily in that the METRRA uses a third-harmonic return from a target while a conventional radar uses a return at the fundamental frequency. A conventional radar can obtain returns from undesired targets such as trees, water, etc. A METRRA radar is not affected by such clutter since it depends on nonlinear junctions, usually the result of fabrication processes, inherent in certain classes of man-made metallic structures. These nonlinear junctions receive transmitted energy and re-radiate harmonics of the transmitted frequency (intermodulation products are generated when more than one transmitter is radiating) which can be received by the METRRA receiving system. GRA

N75-10296# Naval Research Lab., Washington, D.C.
THE J-CODE: A MINIMUM PEAK DISTORTION CODE Interim Report
W. M. Jewett 23 Jul. 1974 20 p
(AD-783949; NRL-7776) Avail: NTIS CSCL 09/4

The transmission of a PCM symbol on a slowly fading Rayleigh channel was examined from the standpoint of minimizing peak distortion from transmission errors. An encoding technique was defined for M-ary DPSK (differential phase-shift keying) wherein multiple values were assigned to the guard band so as to cause peak distortion to be a linear function of the phase error. Comparisons were made of the use of a Gray code and the natural binary code, with a guard band evenly divided into two symbols. The newly devised J code resulted in a lower probability of high peak distortion than either of these two encoding techniques. The mean square distortion of the J code for a slowly, fading Rayleigh channel is shown to be lower than that obtained for the natural binary code with a guard band of pi, and at very low signal-to-noise conditions it is better than the natural binary code with an optimum guard band of 0.4pi.
Author (GRA)

N75-10297# State Univ. of New York, Buffalo.
SUSCEPTIBILITY OF UHF RF TRANSISTORS TO HIGH POWER UHF SIGNALS Interim Report, Jul. 1972 - Jun. 1973
Hollis J. Hewitt and James J. Whalen May 1974 61 p refs
(Contract F30602-72-C-0415)
(AD-780536/9; RADC-TR-74-123) Avail: NTIS HC $3.75 CSCL 09/1

A program is described that was initiated to determine what effects high power UHF/microwave signals have upon solid state components, such as transistors used in RF amplifier stages of UHF/microwave receivers. The effects of CW power at 200 MHz upon the following transistor parameters were monitored: (1) small signal power gain; (2) noise figure; (3) breakdown voltages; (4) leakage currents; and (5) Beta (hFE). The one parameter that did degrade significantly when CW UHF power was applied was the dc current gain Beta. A change in Beta from an initial value of 60 to a value of 15 after exposure is a representative case. These changes in Beta occur at incident power levels significantly below that required to cause component failure. (Modified author abstract) GRA

N75-10298# Lincoln Lab., Mass. Inst. of Tech., Lexington.
FREQUENCY CHOICE FOR TACTICAL SATELLITE COMMUNICATIONS
Kenneth S. Schneider 22 Jul. 1974 64 p refs
(Contract F19628-73-C-0002)
(AD-783912; TN-1974-40; ESD-TR-74-233) Avail: NTIS CSCL 17/2

The relative attractiveness of UHF, L-band and X-band for satellite communications is considered. The three frequency bands are compared on the basis of capacity, jamming protection, scintillation, multipath and Doppler acquisition. It is concluded that UHF presents the greatest advantages when dealing with earth terminals required to use low-gain antennas. The implications that different types of UHF allocations have on satellite design is discussed. Author (GRA)

N75-10299# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
RADIO-ELECTRONICS AND SPACE
A. P. Sivers 22 Jul. 1974 10 p Transl. into ENGLISH from Novoe v Zhizni, Nauke, Tekhnike, Ser. Radioelektronika i Svyaz (USSR), no. 1, 1973 p 1-64
(AD-783968; FTD-MT-24-1436-74) Avail: NTIS CSCL 06/10

A discussion is given about problems solvable by radio-electronics in the process of the study and mastery of space. Systems of radio monitoring of trajectories of space vehicles,

(spacecraft), space radiotelemetry, the sending of instructions, image transmission from space, and radio communication with the astronauts are described. Radio-engineering complexes of the flight monitoring of the spacecraft for space research and practical purposes, the system of satellite communications, radio navigation of vessels and aircraft, meteorology and geodesy are examined. Light is thrown on the problem of communication with extraterrestrial civilizations and prospects for space radio-electronics. GRA

N75-10300# Westinghouse Defense and Electronic Systems Center, Baltimore, Md. Systems Development Div.
STUDY OF THE USE OF CHARGE-COUPLED DEVICES (CCDs) IN ANALOG SIGNAL PROCESSING SYSTEMS Final Report, 15 Sep. 1973 - 15 Mar. 1974
Marvin H. White and William R. Webb May 1974 186 p refs
(Contract N00014-74-C-0069)
(AD-783703; Rept-74-0462) Avail: NTIS CSCL 09/1

The first section of the report describes charge-coupled device (CCD) characteristics such as signal input and output, tap weighting, frequency response, dispersion, dynamic range, linearity, clocking, etc. This is followed by a discussion of basic CCD building blocks (i.e., series in/series out (SI/SO), series in/parallel out (SI/PO), and parallel in/series out (PI/SO)) for discrete analog signal processing (DASP) in which discrete analog samples are transported with an electrically alterable time delay and analog weighted. DASP is contrasted with conventional digital signal processing (DSP) in the remainder of the report and illustrations are presented from representative systems, such as radar, sonar, and communications, to indicate the dramatic savings in cost, weight and volume, and power. A section of the report is devoted to transversal filters and the effects of tap weights and tap weight errors on filter response. (Modified author abstract) GRA

N75-10301# Office of the Director of Defense Research and Engineering, Washington, D.C.
T AND E GUIDELINES FOR COMMAND AND CONTROL SYSTEMS
2 Apr. 1974 39 p
(AD-784550) Avail: NTIS CSCL 15/3

Contents: Conceptual phase; validation phase; full-scale engineering development phase; and substantial production/deployment phase. GRA

N75-10302# Naval Postgraduate School, Monterey, Calif.
DIGITAL DISPLAY OF CHARACTERISTIC PARAMETERS OF ACTIVE RADIO FREQUENCY TRANSMISSION SYSTEMS M.S. thesis
Darl Paul Patrick Jun. 1974 155 p refs
(AD-783806) Avail: NTIS CSCL 17/2

A concept for the digital display of radio-frequency parameters present on a transmission line terminated at an antenna is developed. Design criteria for the realization of this concept are established and discussed. The complete electronic and mechanical design, as well as fabrication of a prototype system analyzer is described in detail. Schematic diagrams of all electronic circuitry employed and photographs of prototype equipment are included. Preliminary performance test results are presented and discussed. Author (GRA)

N75-10303# Army Foreign Science and Technology Center, Charlottesville, Va.
POLARIZATION OF RADAR SIGNALS
D. Kanareikin 14 May 1974 92 p Transl. into ENGLISH from the book "Polyarizatsiya Radiolokatsionnykh Signalov" Moscow, Sovetskoye Radio Press, 1966 p 107-145; 318-350
(AD-783761; FSTC-HT-23-413-74) Avail: NTIS CSCL 17/9

Methods of measuring the polarization parameters of electromagnetic waves are described and compared. Five methods are presented polarization diagram method; compensation method; method of decomposing the wave into orthogonally polarized components; method of several antennas; and modulation method. Components and units of radars with polarization selection of signals are discussed. GRA

N75-10304# Ohio State Univ., Columbus. ElectroScience Lab.
INFORMATION PROCESSING FOR TARGET-DETECTION AND IDENTIFICATION Final Report
A. A. Ksienski May 1974 39 p refs
(Grant AF-AFOSR-1710-69; AF Proj. 9769)
(AD-783229; ESL-2768-13-F; AFOSR-74-1253TR) Avail: NTIS CSCL 17/9

An automatic target identification technique has been developed based on low frequency radar returns. The technique has been shown to be effective for a large variety of targets from simple shapes such as spheres and cubes to complex targets such as airplanes. The technique utilizes the radar returns at specific frequencies as a feature set. Reliable classification has been shown in the presence of considerable amounts of noise. The radar data used to demonstrate the above results have been obtained either experimentally or computationally. An imaging technique has also been developed which produced a synthetic image of the target from low frequency radar returns. The image, displayed on a CRT, is particularly useful for identifying unexpected targets such as may occur in space applications. Author (GRA)

N75-10305# Institute for Telecommunication Sciences, Boulder, Colo.
FINE STRUCTURE PRECIPITATION EFFECTS AND POSSIBLE REMEDIAL TECHNIQUES ON 15 GHz LINE-OF-SIGHT RADIO LINKS
C. A. Samson and J. E. Farrow Jun. 1974 44 p refs Sponsored by Army Communications Command
(ACC Proj. 405-74)
(AD-784096; ACC-ACO-7-74) Avail: NTIS CSCL 17/2

Microscale characteristics of precipitation influence the nature and intensity of fading, but few usable statistics are available to the communication system designer. Although simultaneous transmission of orthogonally polarized signals can theoretically double the information-carrying capacity of the system (throughput), depolarization by precipitation and multipath may severely limit applications of this technique. The use of conventional space diversity or signal processing is not expected to provide the desired performance improvement during heavy rainfall, but route diversity may have this potential. Author (GRA)

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N75-10306 Soviet Radio, Moscow (USSR).
TRANSISTORIZED IMPULSE GENERATORS IN THE MILLISECOND RANGE
Z. P. Vazhenina and E. V. Pudrikov 1974 122 p refs In RUSSIAN
Copyright. Avail: Issuing Activity

Practical diagrams are developed for relaxation wideband generators in dipole and field transistors, as well as in the transistor equivalent of the double-based diode. The principles of their operation are discussed. An analysis of the diagrams provides the required information for numerical calculations. Author

N75-10307 Izdatelstvo Kamenyar, Lvov (USSR).
PROGRESSIVE METHODS OF PRODUCING MICROCIRCUITS
V. V. Demin, Z. Yu. Gotra, and M. D. Matviykiv 1973 82 p refs In RUSSIAN
Copyright. Avail: Issuing Activity

Several physical and technological problems are considered in relation to the use of ion and electron currents in the production of microcircuits. The topics discussed include ion and electron-beam dusting of thin films, thin film treatment using ion and electron currents, electron-beam alloying of semiconductors,

electron-beam welding, and the use of electron and ion beams for controlling the course of technological processes. Author

N75-10308 Energiya Publishing House, Moscow (USSR).
MICRO-ELECTRIC MOTORS RUNNING ON A PULSATING CURRENT ON CONSTANT VOLTAGE
R. N. Kondratenko 1974 99 p refs In RUSSIAN
Copyright. Avail: Issuing Activity

The theory is discussed for transforming constant-voltage electrical energy into mechanical energy for low-power, collector, microelectric motors (from several watts to hundredths of a watt), and which are excited by permanent magnets and have a small number of cells in the armature windings. Periodic changes in the number of cells are calculated for the parallel branch of the armature winding along one side, as well as for the pulsations caused by them in the values of electromotive force, conductivity, current, and electromagnetic moment of the armature. On the basis of theoretical data, the calculation procedure is presented for the armature dimensions, its winding parameters, and the characteristics of the machine. Author

N75-10309 Princeton Univ., N.J.
VIBRATION AND STABILITY OF STRUCTURES WITH HIGH ELECTRIC CURRENTS Ph.D. Thesis
Somnath Chattopadhyay 1974 164 p
Avail: Univ. Microfilms Order No. 74-17442

The effect of electric currents flowing through a structure on the stability and dynamics of the structure is investigated. The vibration of a current-carrying rod is examined in detail. The cross-section of the rod is assumed to be circular and the current distribution in the undeformed rod assumed uniform over the cross-section. The perturbed magnetic field due to bending deformation of the rod has been shown to set up a system of forces which results in a destabilizing effect on the rod. For long wavelength vibrations, a frequency-current dispersion relation is obtained which shows a continuous decrease in the natural frequency of the rod as the current in the rod is increased. At a critical value of current the natural frequency of the rod goes to zero indicating that the rod fails to admit any vibratory motion and buckles. Dissert. Abstr.

N75-10310# Tokyo Univ. (Japan). Inst. of Industrial Science.
ON THE OPERATING CHARACTERISTICS OF INDUCTION MOTORS FED BY THYRISTOR INVERTERS
Fumio Harashima Oct. 1974 27 p refs
(Serial-150-Vol-24-No-1) Avail: NTIS HC $3.75

The operating characteristics of inverter-fed induction motors are discussed on the basis of state transition method. The usefulness of multi-stage inverters and multi-pulse inverters to improve the performance characteristics are shown. The mathematical model of inverter-fed alternating current motors are shown in the form of a time-discrete system. The disadvantages of inverter-fed induction motors such as variations of output torque and heat loss of the motors are analyzed. Experimental results on the operating characteristics of induction motors fed by six-pulse, twelve-pulse, and multiple-pulse inverters are shown in comparison with theoretical results. Author

N75-10311*# Hughes Aircraft Co., Culver City, Calif. Aerospace Groups.
ELECTROMAGNETIC RADIATION SCREENING OF MICRO-CIRCUITS FOR LONG LIFE APPLICATIONS Interim Report, Nov. 1973 - Oct. 1974
W. G. Brammer, J. J. Erickson, and M. E. Levy Oct. 1974 125 p refs
(Contract NAS8-30373)
(NASA-CR-120512; P74-438; HAC-Ref-D0573) Avail: NTIS HC $5.25 CSCL 09C

The utility of X-rays as a stimulus for screening high reliability semiconductor microcircuits was studied. The theory of the interaction of X-rays with semiconductor materials and devices was considered. Experimental measurements of photovoltages, photocurrents, and effects on specified parameters were made on discrete devices and on microcircuits. The test specimens included discrete devices with certain types of identified flaws and symptoms of flaws, and microcircuits exhibiting deviant electrical behavior. With a necessarily limited sample of test specimens, no useful correlation could be found between the X-ray-induced electrical response and the known or suspected presence of flaws. Author

N75-10312*# Martin Marietta Aerospace, Orlando, Fla.
DUAL S AND Ku-BAND TRACKING FEED FOR A TDRS REFLECTOR ANTENNA Final Report, Aug. 1973 - Jun. 1974
Joseph C. Pullara, C. William Bales, George P. Kefalas, and Masao Uyehara Aug. 1974 352 p refs
(Contract NAS5-20415)
(NASA-CR-139122; OR-13225) Avail: NTIS HC $10.00 CSCL 09C

The results are presented of a trade study designed to identify a synchronous satellite antenna system suitable for receiving and transmitting data from lower orbiting satellites at both S- and K sub u-bands simultaneously as part of the Tracking and Data Relay Satellite System. All related problems associated with maintaining a data link between two satellites with a K sub u-band half-power beamwidth of 0.4 db are considered including data link maintenance techniques, beam pointing accuracies, gimbal and servo errors, solar heating, angle tracking schemes, acquisition problems and aids, tracking accuracies versus SNR, antenna feed designs, equipment designs, weight and power budgets, and detailed candidate antenna system designs. Author

N75-10313*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
TESTING OF A FLAT CONDUCTOR CABLE BASEBOARD SYSTEM FOR RESIDENTIAL AND COMMERCIAL WIRING
James D. Hankins Aug. 1974 30 p
(NASA-TM-X-64888) Avail: NTIS HC $3.75 CSCL 09C

The results of extensive testing (mechanical, electrical, chemical, environmental, thermal, and analytical) are reported for a flat conductor cable baseboard system for residential and commercial wiring. In all of the tests Underwriters Laboratories (UL) Standards, UL Tentative Test Programs, or Accepted Engineering Practices were followed during test selection, test setup, and test accomplishment. Author

N75-10314# Bendix Corp., Kansas City, Mo.
EFFECT OF RAPIDLY CHANGING VOLTAGES ON THICK-FILM RESISTORS Final Report
A. G. Bennett May 1974 29 p refs
(Contract AT(29-1)-613)
(BDX-613-1085-Rev) Avail: NTIS HC $3.75

Permanent resistance changes in thick-film resistors are linked to dv/dt sensitivity by this study conducted to determine the mechanisms responsible for these undesirable effects. The resistor is viewed as a network of circuit elements, and an extension of previous theories is proposed to relate the effects of rapidly changing potentials to increased stress on the microscopic distributed capacitances and resistances that comprise thick-film structures and cause resistance reduction resulting from dielectric breakdown and particle fusion. Author (NSA)

N75-10315# Bendix Corp., Kansas City, Mo.
FERRITE-CORE TRANSFORMER BONDING AND POTTING Final Report
W. J. Kirk Jan. 1974 66 p refs
(Contract AT(29-1)-613)
(BDX-613-992) Avail: NTIS HC $4.25

Methods were developed for maintaining thermal stability in inductors enclosed in ferrite pot cores and encapsulated into assemblies. Satisfactory bonds between the core halves were obtained with EA934 adhesive at processing temperatures to 80C. However the force applied to the core interfaces during bonding is critical. Ferrite toroid and pot-core test coils encapsulated in rigid epoxy exhibited large inductance losses after potting despite the application of a thin layer of silicone rubber over the core surfaces. These losses were significantly reduced by adding 68 parts by volume (pbv) of Beta Eucryptite to the epoxy, thereby approximately matching the thermal coefficient of the encapsulant to that of the ferrite. Satisfactory impregnation of small pot-core coil windings was obtained with filler concentrations to 46 pbv; however, additional work will be necessary to obtain adequate impregnation with higher filler concentrations.
Author (NSA)

N75-10316# Sandia Corp., Albuquerque, N.Mex.
EVALUATION OF PRE-BOND ETCHANTS IN HYBRID MICROCIRCUIT PROCESSING
P. H. Holloway and R. L. Long, Jr. Nov. 1973 67 p refs
(Contract AT(29-1)-789)
(SLA-73-1049) Avail: NTIS HC $4.25

In order to remove a surface chromium oxide contaminant that interferes with thermocompression bonding, a pre-bond chemical etching step in hybrid microcircuit was used in processing. To solve a production processing problem, five different etchants were tested to determine which most effectively increased the thermocompression bondability of HMC's. Limited data on ceric ammonium sulfate and sodium cyanide etchants indicated they could restore bondability. Extensive data demonstrated that a ceric ammonium nitrate etchant restored the bondability of HMC's, did not change the surface topography, did not cause thin film deadhesion, and did not cause deleterious effects during accelerated aging tests. The incorporation of CAN as the pre-bond etchant in HMC processing is recommended. Author (NSA)

N75-10317# Sandia Corp., Albuquerque, N.Mex.
EFFECT OF SOLDERING FLUX ON Ta2N RESISTORS
G. J. Hof Apr. 1974 18 p
(Contract AT(29-1)-789)
(SLA-73-1045) Avail: NTIS HC $3.25

Assembly by soldering results in the presence of excess flux that is normally removed with alcohol or trichloroethylene. In hybrid microcircuits solvents may be retained in crevices or voids. This study considers the effect of flux on TA2N resistors in hybrid microcircuits assuming that excess flux is not removed to avoid using solvents. TA2N resistors were tested for stability during heating in air at 150C for 200 hours. Flux does cause a resistance value increase and excess flux removal is recommended. Author (NSA)

N75-10318# Siemens A.G., Munich (West Germany). Sektion Festkoerperforschung.
PIEZOELECTRIC TRAVELING WAVE AMPLIFIERS [PIEZOELEKTRISCHE WANDERFELDVERSTAERKER]
Ludwig Hoffmann, Helmut Thomann, and Jutta Mohaupt Bonn Bundesmin. fuer Forsch. und Technol. May 1974 88 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-T-74-05) Avail: NTIS HC $4.75; ZLDI, Munich 18,10 DM

The properties of modern piezoelectric ceramics render possible the application of these materials in electroacoustic devices (below 100 MHz). Ceramics are basic material for traveling wave amplifiers using surface elastic waves. Due to the strong coupling and to the improved dielectric match to the semiconductor in comparison to Rayleigh waves, surface shear waves are of particular interest. The propagation behavior of Rayleigh and Bleustein-Gulyaev-waves has been investigated. The transmission of the active delay line is adjustable within 30 db per centimeter (12.5 MHz) by the drift field. Using surface shear waves, the design of a delay line with variable delay time up to 50 microseconds is possible. Author (ESRO)

N75-10319# Siemens A.G., Munich (West Germany). Unternehmensbereich Bauelemente.
FUNCTIONING OF POWER RECTIFIERS AND THYRISTORS FROM 1 JANUARY 1970 TO 31 DECEMBER 1972
Eberhard Spenke, Joachim Burtscher, Friedrich Dannhaeuser, Karl Peter Frohmader, Juergen Krausse, and Peter Voss Bonn Bundesmin. fuer Forsch. und Technol. May 1974 31 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-T-74-07) Avail: NTIS HC $3.75; ZLDI, Munich 6,10 DM

The stationary forward voltage drop across rectifiers and the dependence of the carrier mobility on the concentration of the injected carriers was especially determined, as well as the distribution of the recombination between the middle region and the border regions. The share of the middle region under normal operation conditions (100 A/sq cm) is less than 20% and for surge current loads (1000 A/sq cm) less than 10%. Basic investigations of the influence of the shorted emitter of thyristors led to a quantitative understanding of the effect of the individual shorts. The course of ignition processes in thyristors that had different gate arrangements was made visible and investigated in detail taking advantage of the infrared recombination radiation. This also led to the development of thyristors with a controlled breakover. The local distribution of the breakdown current in power devices with deep pn-junctions was investigated observing the breakdown radiation in the infrared. A clear connection to resistivity fluctuations (striations) in the starting material was revealed. Author (ESRO)

N75-10320# Max-Planck-Institut fuer Physik und Astrophysik, Munich (West Germany).
THE ELECTRONICS OF THE PLASMA DRIFT EXPERIMENT S 329 IN THE GEOS SATELLITE [DIE ELEKTRONIK DES PLASMADRIFTEXPERIMENTES S 329 IM GEOS-SATELLITEN]
F. Melzner and G. Metzner Feb. 1974 111 p refs In GERMAN
(MPI-PAE/TB-Extraterr-10) Avail: NTIS HC $5.25

Electronic equipment for measuring plasma drifts with the aid of GEOS satellites (experiment S329) is described. The equipment consists of sensor, electronic box, and four identical electron guns of which only one at a time is operating. The functions of the different components, including the analog computer, are detailed and the different test instruments are dealt with. ESRO

N75-10321# Siemens A.G., Munich (West Germany). Unternehmensbereich Ba relemente.
PROBLEMS IN PRODUCING HIGHEST ENERGY DENSITIES BY ORGANIC CAPACITOR DIELECTRICS [PROBLEME BEI DER ERZEUGUNG HOECHSTER ENERGIEDICHTEN MIT ORGANISCHEN KONDENSATORDIELEKTRIKEN]
Reinhard Behn, Horst Hagedorn, Gerhard Hoyler, Johann Kammermaier, Axel Schnitzler, Gerhard Seebacher, Reiner Simson, and Ulrich Wehnelt Bonn Bundesmin. fuer Forsch. und Technol. May 1974 87 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-T-74-10) Avail: NTIS HC $4.75; ZLDI, Munich 18,30 DM

The problems met when producing highest energy densities with organic dielectrics for capacitors are due to the necessity of microminiaturization. The most important physical tasks are the effect of high field strengths together with partial discharges (glow discharges), insulation behavior, self-healing, production of films, and moisture effects. The tests done in the field of self-healing capacitors lead to decisive results in the application of high field strengths in metallized organic dielectrics. Author (ESRO)

N75-10322# AEG-Telefunken, Heilbronn (West Germany).
TECHNOLOGY OF INTEGRATION OF JUNCTION FIELD EFFECT TRANSISTORS Final Report [TECHNOLOGIE DER INTEGRATION VON SPERRSCHICHT-FELDEFFEKT-TRANSISTOREN. ABSCHLUSSBERICH]
Karl Baehr and Heinz Rinderle Bonn Bundesmin. fuer Forsch. und Technol. May 1974 26 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-T-74-11) Avail: NTIS HC $3.75; ZLDI, Munich 5,40 DM

The technology of monolithic integration of electrical independent n-channel junction field effect transistors by two different methods was developed and investigated. Junction field effect transistors with square law transfer characteristic, values of transconductance up to 30.000 micro mho at pinch off voltages between 2 and 5 volts and drain currents between 20 and 60 mA could be integrated. The influences of gate geometry on the electrical characteristics of JFET and the consequences of the additional equivalent circuit components of the integrated JFET's were investigated. Author (ESRO)

N75-10323# Marconi Co., Ltd., Chelmsford (England).
TRAVELING WAVE TUBE LINEARISER Final Report
Dec. 1973 136 p refs
(Contract ESTEC-1773/72-MD)
(ESRO-CR(P)-489) Avail: NTIS HC $5.75

The first phase of a program is discussed aimed at developing a traveling wave tube amplifier linearizer by producing a

breadboard model to study the degree of linearization versus complexity. The work carried out covers the design and construction of low frequency analogs, microwave structures and amplifiers, design and construction of linearizers, and system tests. The breadboard model incorporates level-sensitive amplitude and phase correction facilities. ESRO

N75-10324# Valvo G.m.b.H., Hamburg (West Germany).
FM LABORATORY MEASUREMENTS ON THE 12GHz KLYSTRON YK 1210 (V42SK) Final Report
H. Bohlen and U. Feddern 20 Feb. 1973 51 p
(Contract ESTEC-1513/71-IS)
(ESRO-CR(P)-523) Avail: NTIS HC $4.25

A super high frequency klystron was tested under conditions for FM-TV transmitters at output powers between 1200 and 1650 W. For FM measurements the klystron was tuned to a broadband frequency response. With this tuning scheme a gain of about 35 db was achieved. At saturation level the bandwidth between the -1 db points was about 40 MHz with a gain ripple of about plus or minus 0.2 db. The variation of the group delay was in the expected range of about 20 ns. An AM-Pm conversion coefficient of only less than or equal to 3 deg/db was measured. Besides these absolute data the influence of the varying beam data and harmonics was tested. Attempts were made to minimize the group delay variation. ESRO

N75-10325# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DETERMINATION OF THE ENERGY OF PULSE CURRENT BY A THERMO-ELECTRIC CONVERTER
B. P. Kozyrev and T. Yu. Sheveleva 24 Jun. 1974 11 p refs Transl. into ENGLISH from Izv. Elektrotekhn. Inst. (Leningrad), v. 71, no. 99, 1972 p 34-37
(AD-783561; FTD-HT-23-1529-74) Avail: NTIS CSCL 14/2

A description is given of two designs of thermal converters for the integration of currents of more than 10 microamps in low-resistance circuits. The frequency range of the instruments is 0-25 mHz, and the time constant is within 5-10 minutes. GRA

N75-10326# Naval Ammunition Depot, Crane, Ind.
EVALUATION OF THE THERMAL CHARACTERISTICS OF THE AN/WQC-2 FINAL AMPLIFIER
Jack R. Penrod 1974 22 p
(AD-783953; NAD-CR-TR-7022/C74/1) Avail: NTIS CSCL 09/5

An investigation was made of the thermal breakdown of eight AN/WQC-2 final amplifier transistors. After extensive investigation, it was found that the AN/WQC-2 system is safeguarded against final amplifier transistor failure due to overheating by a thermal interlock switch (3A4S1) mounted, essentially, on one of the final amplifier transistors (3A4Q17). In the event of a blower (3A4B1) failure the final amplifier would be protected, unless, either final amplifier transistor, 3A4Q17, or thermal interlock 3A4S1, was inoperative, then the thermal protection circuit would be defeated and thermal breakdowns imminent. Another possible final amplifier failure mode is direct overloading of the amplifier by too great of an Auxiliary 2 mode drive level, which would always lead to transistor failures. (Modified author abstract) GRA

N75-10327# Naval Research Lab., Washington, D.C.
A PROTOTYPE FOUR-HORN CLUSTER IFF ANTENNA Final Report
Edward C. Bean Jul. 1974 23 p refs
(AD-784395; NRL-MR-2836) Avail: NTIS CSCL 09/5

The experimental design of a prototype four-horn cluster IFF antenna is described. The antenna was evaluated for voltage standing wave ratio (VSWR), model antenna range patterns, and in-flight horizontal and banked aircraft radiation patterns. The data is presented to show that each antenna horn demonstrates isotropic gain within plus or minus 45 degrees of its azimuth pointing direction and a front to back ratio gain of about 20 db. The prototype antenna will provide an aircraft with improved and controlled coverage for reception of IFF signals and will limit the volume of space to which its replies are radiated. Author (GRA)

N75-10328# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CALCULATING SYNCHRONOUS INDUCTIVE REACTANCES OF CONTACTLESS MACHINES WHEN MAGNETIC CIRCUIT IS SATURATED AND OF MACHINES WITH SUPERCONDUCTING EXCITATION WINDINGS
L. M. Palastin 15 Aug. 1974 25 p refs Transl. into ENGLISH from Elektrotekhnika (USSR), no. 2, Feb. 1973 p 20-25
(AD-784696; FTD-HT-23-1184-74) Avail: NTIS CSCL 09/3

The work studies the effect of magnetic circuit saturation on the synchronous inductive reactance of the armature. A practical method is given for calculating synchronized parameters in saturating synchronized machines with additional clearances and machines with superconducting excitation windings. GRA

N75-10329# Texas Instruments, Inc., Dallas. Semiconductor Group.
PRODUCTION ENGINEERING MEASURE FOR AN INTEGRATED POWER SWITCH (IPS) Quarterly Report, 18 Oct. 1973 - 17 Jan. 1974
Bill H. Terrell and L. Wayne Gordon Aug. 1974 47 p
(Contract DAAB05-73-C-2063)
(AD-784317; TI-03-74-18; QR-3) Avail: NTIS CSCL 09/5

The report covers the effort expended and performance achieved in the establishment of a production capability for a universally applicable switching component for use in precision power-conversion equipment. The universal application of the Integrated Power Switch (IPS) is assured by signal input requirements compatible with popular DTL or TTL logic, two separate power switch sections isolated by optical coupling from the input signals, internal protection from the most common equipment-failure modes, and a usable frequency range from continuous operation to 10 kHz. GRA

N75-10330# Army Foreign Science and Technology Center, Charlottesville, Va.
SYNTHESIS OF ANTENNA ARRAYS
E. G. Zelkin Aug. 1974 17 p refs Transl. into ENGLISH from Antenny (USSR), vol. 1, 1966 p 34-46
(AD-784410; FSTC-HT-23-574-73) Avail: NTIS CSCL 09/5

One method of approximate synthesis of uniform spaced and unequally spaced antenna arrays is set forth; linear and planar arrays are examined. GRA

N75-10331# Hughes Aircraft Co., Fullerton, Calif. Ground Systems Group.
BURST PROCESSOR TAPPED DELAY LINE Final Report, 1 Oct. 1971 - 31 Dec. 1973
P. B. Snow May 1974 30 p
(Contract DAAB07-72-C-0046; DA Proj. 7X2-63304-D-215)
(AD-779473; FR-74-14-339; ECOM-0046-F) Avail: NTIS CSCL 09/1

The objective of the program is a feasibility determination for implementing Doppler resolution filter configured as an acoustic surface wave tapped delay line. The burst Processor Tapped Delay Line (BPTDL) utilizes a parallel channel geometry such that each delay output is derived from a separate acoustic channel. The results of the evaluation of two prototype models confirm that the original performance being difficulty in achieving high resolution transducer photodeposition over the large pattern area. The last six months effort has been directed at developing improved fabrication methods, with the results being the demonstration of new photolithography techniques that are capable of producing acceptable BPTDL patterns and the delivery of two prototype circuits. This report presents the accomplishments of this effort. Author

N75-10332# Office of the Director of Defense Research and Engineering, Washington, D.C.
T AND E GUIDELINES FOR AIRBORNE ECM SYSTEMS
2 Apr. 1974 32 p
(AD-784574) Avail: NTIS CSCL 17/4

The checklist items presented are specifically applicable to airborne ECM testing and evaluation. The following classes of airborne ECM equipment were considered. Active jammers carried on dedicated ECM aircraft. Airborne passive reconnaissance and warning systems. Active jammer pods carried by tactical aircraft. Active jammers carried internally on strategic aircraft. Deceptive

repeater jammers carried both internally and in pods on tactical or strategic aircraft. The checklist items are organized into time phases of the acquisition process, and might cover the (1) evaluation of work that occurred in the previous phase, (2) conduct of tests planned in the previous phase and executed in the subject phase, and (3) plans and other preparatory actions for test schedules to be conducted in a subsequent phase. GRA

N75-10333# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CAUSES FOR THE OCCURRENCE OF PULSED INTERFERENCE IN REMOTE-CONTROL CONNECTION CIRCUITS
K. K. Abramov and V. S. Fedenko 19 Jul. 1974 11 p Transl. into ENGLISH from the book "Ustroistva i Elementii Promyshlennoi Telemekhaniki" 1954 p 50-54
(AD-783917; FTD-HT-23-1706-74) Avail: NTIS CSCL 09/1
The article examines the conditions of the occurrence of pulsed interference in short sections of connecting lines. GRA

N75-10334# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HARMONIC COMPONENTS, OF THE MAGNETIC CONDUCTIVITY OF THE AIR GAP OF ELECTRIC MOTORS ON A GEAR SURFACE
I. I. Talalov and Yu. I. Stradomskii 17 Jul. 1974 17 p refs Transl. into ENGLISH from Electrotekhnika (USSR), no. 1, Jan. 1973 p 49-52
(AD-783930; FTD-HT-23-1147-74) Avail: NTIS CSCL 09/3
An analytical method for determining the field on a gear surface is proposed, taking into account the effect of the distribution of normal components. The results of the calculations are presented in the form of generalized dependences for the amplitude coefficients of the harmonic components of magnetic conductivity. GRA

N75-10335# New Mexico State Univ., University Park. Physical Science Lab.
STRIPLINE FLUSH MOUNT ANTENNA ARRAY Scientific Report, Oct, 1972 - Oct. 1973
Alexander Waterman and Dennis G. Henry Nov. 1973 25 p refs
(Contract F19628-72-C-0065; AF Proj. 7659)
(AD-783334; PSL-PS00792; AFCRL-TR-0039; SR-1) Avail: NTIS CSCL 09/5
The major development goals for the particular stripline array were electrical and mechanical in nature. Electrically, the antenna was to operate in the 2.2-2.3 GHz S-band TM region. The radiation coverage was to be omnidirectional at a moderate gain level. Mechanically, the array was to be flush mounted with a minimum of effort. The antenna was to use the smallest possible axial area on a nine inch diameter vehicle. The unit had to be light weight and withstand surface temperatures of 400F for short periods of time. Author (GRA)

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N75-10336 Colorado State Univ., Fort Collins.
TURBULENCE INDUCED CHANGES IN VORTEX SHEDDING FROM A CIRCULAR CYLINDER Ph.D. Thesis
Kenneth M. Barnett 1974 238 p
Avail: Univ. Microfilms Order No. 74-20738
Turbulence effects on vortex shedding from a circular cylinder were investigated in a wind tunnel. In this study, turbulence intensity, near the center of a wind tunnel, was increased from .3% to 25% by plates of similar geometry (many small holes) with blockage ratios from .50 to .97j A model of vortex shedding is hypothesized which includes the concept that vortex shedding is continuous from Re near 40 until either the mean air speed and the turbulence intensity, or both, are increased until turbulence destroys individual vortices before they can be shed.
Dissert. Abstr.

N75-10337 Catholic Univ. of America, Washington, D.C.
THE STABILITY OF PARALLEL FLOWS BETWEEN PLANE BOUNDARIES OF TWO SUPERPOSED VISCOELASTIC FLUIDS Ph.D. Thesis
Norman Alan Eisenberg 1974 94 p
Avail: Univ. Microfilms Order No. 74-19413
The stability of parallel flows between plane boundaries of two superposed viscoelastic fluids was analyzed. The Oldroyd B model is used to describe the rheological properties of the viscoelastic fluid. The governing equations for the layered, time-invariant, and parallel flow between plane boundaries are solved. Perturbations to the steady flow are postulated. The stability characteristics of the flow depend upon whether these perturbations grow or decay in time. The interfacial stability characteristics of the flow were determined. The stability of the plane Poiseuille flow of two superpoised viscoelastic fluids is examined in general, and three cases of plane Poiseuille flow are investigated in detail. Horizontal plane Couette flow was also studied in detail. General results are given, and detailed numerical analyses are presented for the contribution of viscoelasticity to flow stability. It is concluded that the effect of viscoelasticity is stabilizing, and properly formulated boundary conditions on shear stress have significant effect on the solutions. Dissert. Abstr.

N75-10338 Iowa Univ., Iowa City.
NUMERICAL MODELING OF UNSTEADY FLOW WITH NATURAL AND FORCED SEPARATION Ph.D. Thesis
Arthur Ralph Giaquinta 1974 207 p
Avail: Univ. Microfilms Order No. 74-21893
This thesis presents a numerical investigation of unsteady, separated viscous flow. Natural separation at a conduit expansion is first examined, followed by a study of forced separation due to the introduction of a lateral jet. A brief summary of the important historical contributions to computational methods in fluid dynamics and a discussion of many available techniques is followed by numerical studies of the equations governing the laminar flow of an incompressible fluid through a two-dimensional sudden expansion. The time-dependent Navier-Stokes equation is transformed into a vorticity transport equation. This transport equation is numerically solved concurrently with the Poisson equation which is coupled to it through the kinematic condition derived from the definition of the vorticity function.
Dissert. Abstr.

N75-10339 Colorado Univ., Boulder.
HEAT TRANSPORT IN POROUS INSULATIONS AT CRYOGENIC TEMPERATURES Ph.D. Thesis
Richard Paul Reinker 1974 104 p
Avail: Univ. Microfilms Order No. 74-22383
The objective of this research was to obtain experimental data to determine the temperature dependence of the thermal conductivity and the thermal diffusivity for three evacuated porous insulations used in cryogenic storage systems. Experimental apparatus was built for this study which is capable of measuring both the thermal conductivity and the thermal diffusivity of the same unaltered sample: this prevents any possible sample variation between the conductivity and diffusivity measurements. Thermal conductivities were analyzed by steady-state techniques applying a small temperature gradient (less than 10K) across the sample. Thermal diffusivities were measured by monitoring the transient temperature-time responses of the samples. The conductivity and diffusivity were found to be highly temperature dependent in all cases, with the conductivity varying by as much as a factor of 400 over the temperature range 4-298K. Samples analyzed included: perlite, glass microspheres, and hemispherically aluminized glass microspheres.
Dissert. Abstr.

N75-10340 Vanderbilt Univ., Nashville, Tenn.
THE UNIT REYNOLDS NUMBER EFFECT ON BOUNDARY LAYER TRANSITION Ph.D. Thesis
John Leith Potter 1974 200 p
Avail: Univ. Microfilms Order No. 74-22187
This research was undertaken with the purpose of determining

whether the Reynolds number characterizing the location of boundary layer transition on a body in free flight within an aeroballistic range would vary as the unit Reynolds number changed. The more prominent features of free-flight experimentation that may be suspected of influencing boundary layer transition were investigated. These included (1) oscillatory motion and finite angles of attack, (2) cold-wall surface roughness at high unit Reynolds numbers, (3) vibration of the model, and (4) nonuniform (hot-tip) surface temperature. There was no evidence that any of these four range conditions influenced the major results, but all are discussed. Dissert. Abstr.

N75-10341 Texas A&M Univ., College Station.
THE HYDRODYNAMIC IMPACT OF A FALLING BODY UPON A VISCOUS INCOMPRESSIBLE FLUID Ph.D. Thesis
Buford Ray. Koehler, Jr. 1974 158 p
Avail: Univ. Microfilms Order No. 74-21201

The hydrodynamic impact of a falling body upon a viscous incompressible fluid is investigated by the development and solution of a mathematical model. The mathematical model simulates the impact of a rigid flat bottom body upon the quiescent free surface of viscous incompressible water. A compressible air layer exists between the falling body and the water free surface. The mathematical model is developed by applying the Navier-Stokes equations to the compressible air layer and the water. The compressible air layer is assumed to be one-dimensional within the layer. Velocity and pressure distributions within the air layer are calculated using the continuity equation and the one-dimensional momentum equation. The water free surface is allowed to deform as the air pressures acting on it increase. The two-dimensional rectangular coordinate form of the Navier-Stokes equations for an incompressible fluid are applied to the water. Dissert. Abstr.

N75-10342 Purdue Univ., Lafayette, Ind.
INTERMITTENCY, THE ENTRAINMENT PROBLEM Ph.D. Thesis
Paul Michael Bevilaqua 1973 139 p
Avail: Univ. Microfilms Order No. 74-15121

The mechanism of entrainment in turbulent wake flows was examined. The development of the wake is dominated by the vortices shed from the recirculation region. These vortices cause the rapid diffusion of the mean flow, and the appearance of waves on the turbulent interface. The persistence of the vortices is the result of a strain energy that is stored in the anisotropy of the turbulence. The effect of the vortices on the mean flow is described by relating the size and strength of the vortices to an additional eddy viscosity. Dissert. Abstr.

N75-10343 Pennsylvania State Univ., University Park.
THE ENTROPIC ENERGY OF GEOPHYSICAL FLUID SYSTEMS Ph.D. Thesis
Robert Earl Livezey 1973 103 p
Avail: Univ. Microfilms Order No. 74-20941

The objective is to develop an integral theory for a wide class of fluid systems that not only includes the concepts of balance of mass, momentum, and energy, but also of entropy and the second law of thermodynamics. This theory provides an explicit relationship between the integrals of kinetic energy and of entropy in terms of a new energy form, the entropic energy. Materially homogeneous elastic fluids and linearly viscous fluids whose entropy functions are strictly concave are defined as equilibrium regular fluids. A fluid system consists of an equilibrium regular fluid of fixed mass M, whose body force is a consequence of a steady, positive, monotonic potential field, and whose bounds satisfy certain specified conditions. Geophysical fluid systems are a non-degenerate set of fluid systems. Dissert. Abstr.

N75-10344 Connecticut Univ., Storrs.
HEAT TRANSFER CHARACTERISTICS OF AN IMPINGING JET IN A CROSSFLOW Ph.D. Thesis
Bruce Robert Hollworth 1974 173 p
Avail: Univ. Microfilms Order No. 74-21783

The results of an experimental investigation of the effect of a crossflow upon the heat transfer from a single impinging jet are presented. A round, turbulent air jet was injected normal to a crossflow with a fully developed turbulent velocity profile, and a total temperature equal to that of the jet. The jet impinged downstream and cooled that part of the flat surface corresponding to the jet's footprint. Measurements were made of the downstream deflection of the impingement point, and of local heat transfer coefficients through the footprint. This data was correlated in terms of jet Reynolds number, crossflow Reynolds number, crossflow-to-jet momentum ratio, jet standoff distance, and jet diameter (d). Dissert. Abstr.

N75-10345 Pennsylvania State Univ., University Park.
THE PREDICTION OF TURBULENT CONFINED JET MIXING WITH AND WITHOUT SWIRL Ph.D. Thesis
Charles Joseph Hendricks 1974 205 p
Avail: Univ. Microfilms Order No. 74-21000

An analytical investigation of turbulent confined jet mixing is presented. The study concerns isothermal incompressible mixing of a turbulent jet with a coaxial slower-moving secondary stream in a confining tube. Of special interest is the effect of introducing an initial tangential or swirl velocity to the jet. The analytical results are compared with the experimental data of several investigators. Good agreement was obtained between calculated results and the measured data for mean velocity and pressure. Results for mean velocity and pressure were determined for systematic variations of the radius and velocity ratios, swirl magnitude and inlet turbulence kinetic energies respectively. The approach used in the analysis is a numerical solution of the governing flow equations (Reynolds' equations) which are simplified by the Prandtl boundary layer assumptions.
Dissert. Abstr.

N75-10346 Stanford Univ., Calif.
SHOCK-TUBE STUDIES OF VIBRATIONAL EQUILIBRATION IN CARBON DIOXIDE BY SIMULTANEOUS LASER ABSORPTION AND INFRARED-EMISSION MEASUREMENTS Ph.D. Thesis
Lawrence Lasher 1974 89 p
Avail: Univ. Microfilms Order No. 74-20208

An experiment has been designed in which simultaneous radiation measurements are made at three different infrared wavelengths in order to determine the vibrational relaxation of carbon dioxide behind a shock wave. The relaxation is exhibited by the time histories of two infrared emissions and an absorption of incident laser light, all recorded at the observation windows of a shock tube. The laser source is a continuous-wave tunable carbon dioxide laser which provides radiation at a single vibrational-rotational line in the 10 micron wavelength region. The laser beam passes through the side windows of the shock tube and is absorbed by the shock-heated carbon dioxide. The increase in absorption that occurs as the shock passes indicates how the population of the absorbing level grows during its relaxation toward an equilibrium value. The emissions monitored at the bottom and top windows are at wavelengths of 4.3 and 15 microns, respectively, and show the relaxation of the asymmetric and bending modes of carbon dioxide.
Dissert. Abstr.

N75-10347*# Grumman Aerospace Corp., Bethpage, N.Y.
HEAT PIPE MANUFACTURING STUDY Final Report
F. Edelstein Aug. 1974 223 p refs
(Contract NAS5-23156)
(NASA-CR-139140; CEM-10R) Avail: NTIS HC $7.25 CSCL 20M

Heat pipe manufacturing methods are examined with the goal of establishing cost effective procedures that will ultimately result in cheaper more reliable heat pipes. Those methods which are commonly used by all heat pipe manufacturers have been considered, including: (1) envelope and wick cleaning, (2) end closure and welding, (3) mechanical verification, (4) evacuation and charging, (5) working fluid purity, and (6) charge tube pinch off. The study is limited to moderate temperature aluminum and stainless steel heat pipes with ammonia, Freon-21 and methanol working fluids. Review and evaluation of available manufacturers techniques and procedures together with the results of specific manufacturing oriented tests have yielded a set of recommended cost-effective specifications which can be used by all manufacturers. Author

N75-10348*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

AN INLET ANALYSIS FOR THE NASA HYPERSONIC RESEARCH ENGINE AEROTHERMODYNAMIC INTEGRATION MODEL

Earl H. Andrews, Jr., James W. Russell (LTV Aerospace Corp., Hampton, Va.), Ernest A. Mackley, and Ann L. Simmonds Washington Nov. 1974 46 p refs

(NASA-TM-X-3038; L-9353) Avail: NTIS HC $3.75 CSCL 20D

A theoretical analysis for the inlet of the NASA Hypersonic Research Engine (HRE) Aerothermodynamic Integration Model (AIM) has been undertaken by use of a method-of-characteristics computer program. The purpose of the analysis was to obtain pretest information on the full-scale HRE inlet in support of the experimental AIM program (completed May 1974). Mass-flow-ratio and additive-drag-coefficient schedules were obtained that well defined the range effected in the AIM tests. Mass-weighted average inlet total-pressure recovery, kinetic energy efficiency, and throat Mach numbers were obtained. Author

N75-10349# Argonne National Lab., Ill. Components Technology Div.

ADDED MASS AND DAMPING OF A VIBRATING ROD IN CONFINED VISCOUS FLUIDS

M. W. Wambsganss, S. S. Chen, and J. A. Jendrzejczyk Sep. 1974 30 p refs

(Contract W-31-109-eng-38)

(ANL-CT-75-08) Avail: NTIS HC $3.75

An analytical and experimental study of a cylindrical rod vibrating in a viscous fluid enclosed by a rigid, concentric cylindrical shell is presented. A closed form solution for the added mass and damping coefficient is obtained and a series of experiments with cantilevered rods vibrating in various viscous fluids is performed. Experimental data and theoretical results are in good agreement. Author

N75-10350# Argonne National Lab., Ill. Reactor Analysis and Safety Div.

NAHAMMER: A COMPUTER PROGRAM FOR ANALYSIS OF ONE-DIMENSIONAL PRESSURE PULSE PROPAGATION IN A CLOSED FLUID SYSTEM

W. L. Chen, D. H. Thompson, and Y. W. Shin May 1974 53 p refs

(Contract W-31-109-eng-38)

(ANL-8059) Avail: NTIS HC $4.25

A numerical method is presented for linear inviscid fluid-hammer analysis based on the method of characteristics. It uses the analytical solutions of the wave equation in place of the compatibility equations of the more conventional method of characteristics. The numerical solution is obtained by a simple superposition technique for tracing the waves traveling along each characteristic and extends the solution from one constant time line to the next. Using the predetermined constant characteristic net, the spatial interpolation was eliminated, maintaining the pressure wave in its full amplitude in the numerical procedure. This contrasts to the case of a nonlinear problem in which the pressure peaks are always flattened in the interpolation procedure. Author

N75-10351*# Boeing Co., Wichita, Kans.

ACOUSTIC GRAZING FLOW IMPEDANCE USING WAVE-GUIDE PRINCIPLES

D. L. Armstrong 12 Dec. 1971 109 p refs

(Contract NAS3-14321)

(NASA-CR-120848; D3-8684) Avail: NTIS HC $5.25 CSCL 20D

A grazing flow apparatus was designed to measure the impedance of acoustic materials when installed in environments that subject the material to grazing airflow. The design of the apparatus and the data analysis technique is based on the solution of the convected wave equation in an infinite length waveguide. Author

N75-10352*# Techtran Corp., Glen Burnie, Md.

COMPARATIVE MEASUREMENTS BEHIND A COMPRESSOR ROTOR WITH A SPACE-BOUND AND COROTATING CYLINDRICAL PROBES

A. Klein Washington NASA Oct. 1974 25 p refs Transl. into ENGLISH from Forsch. Ingenieurw. (Duesseldorf), v. 40, no. 1, 1974 p 25-34

(Contract NASw-2485)

(NASA-TT-F-15833) Avail: NTIS HC $3.25 CSCL 20D

The total pressure and the flow angle at various distances from the axis were studied for four rotor speeds. Data obtained with a cylindrical probe which rotated with the rotor are compared with values indicated by the same probe kept in a fixed position. No significant differences concerning the mean total pressure, or the flow angle at great distances from the axis could be observed for both probe positions. There were, however, differences in the flow angle amounting to as much as two deg in locations near the axis. Author

N75-10353*# Scientific Translation Service, Santa Barbara, Calif.

REMARKS ABOUT THE INFLUENCE OF DENSITY FLUCTUATIONS IN TURBULENT BOUNDARY LAYERS FOR COMPRESSIBLE FLOW

J. C. Rotta Washington NASA Oct. 1974 11 p refs Transl. into ENGLISH from Ing.-Arch. (Germany), v. 32, 1963 p 187-190

(Contract NASw-2483)

(NASA-TT-F-15989) Avail: NTIS HC $3.25 CSCL 20D

The contributions of the density fluctuations to the momentum and heat transport near the wall within the boundary layer are investigated in a more rigorous fashion than was done in a paper by Szablewski. Relationships between temperature, pressure and density fluctuations are presented as well as density fluctuation terms in the wall flow law. Author

N75-10354*# Kanner (Leo) Associates, Redwood City, Calif.

EXPERIMENTAL DETERMINATION OF THE PRESSURE RECOVERY COEFFICIENTS IN CONICAL DIFFUSORS AT LARGE SUBSONIC VELOCITIES UNDER VARIOUS INLET CONDITIONS

Ya. L. Ginzburg and I. Ye. Idelchik Washington NASA Oct. 1974 15 p refs Transl. into ENGLISH from Uch. Zap. TsAGI (USSR), v. 4, no. 3, 1973 p 23-31

(Contract NASw-2481)

(NASA-TT-F-15991) Avail: NTIS HC $3.25 CSCL 20D

Relations are presented between the pressure recovery coefficients and the relative flow velocities for difussors set in a network and at the network outlet, with various expansion angles and degrees of expansion and relative lengths of the straight inlet section. They are given as curves of results of the investigations of conical diffusors at large subsonic velocities under various conditions. The data and calculations include both purely internal pressure losses in the diffusor and the pressure losses beyond it, in the straight outlet section. It is stated that there are considerable differences from experiments and calculations using the data of Szilard. Author

N75-10355*# Scientific Translation Service, Santa Barbara, Calif.

ONE METHOD OF NUMERICAL SOLUTION OF THE NAVIER-STOKES EQUATIONS FOR A COMPRESSIBLE GAS

A. I. Tolstykh Washington NASA Oct. 1974 20 p refs Transl. into ENGLISH from Uch. Zap., TsAGI (USSR), v. 3, no. 6, 1972 p 78-87

(Contract NASw-2483)

(NASA-TT-F-15992) Avail: NTIS HC $3.25 CSCL 20D

A description is presented of a method of obtaining numerical solutions to the Navier-Stokes equations for various problems of aerodynamics in a wide range of Reynolds numbers. The proposed method is based on stretching regions in which the unknown functions have large gradients. Problems of the flow in a shockwave or flows past blunt bodies at fairly large Reynolds numbers are taken as examples where the proposed method is applicable. In the case of the latter type of flow, a difference scheme with a high order of accuracy is presented. Author

N75-10356*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

A SIMPLE METHOD OF CALCULATING POWER-LAW VELOCITY PROFILE EXPONENTS FROM EXPERIMENTAL DATA

Jerry M. Allen Oct. 1974 24 p refs

(NASA-TM-X-72000) Avail: NTIS HC $3.25 CSCL 20D

Analytical expressions for the effects of compressibility and

heat transfer on laminar and turbulent shape factors H have been developed. Solving the turbulent equation for the power law velocity profile exponent N has resulted in a simple technique by which the N values of experimental turbulent profiles can be calculated directly from the integral parameters. Thus the data plotting, curve fitting, and slope measuring, which is the normal technique of obtaining experimental N values, is eliminated. The N values obtained by this method should be within the accuracy with which they could be measured. Author

N75-10357*# Arkansas Univ., Little Rock. Dept. of Electronics and Instrumentation.

FLOW TRACING FIDELITY OF SCATTERING AEROSOL IN LASER DOPPLER VELOCIMETRY

M. K. Mazumder and K. J. Kirsch [1974] 29 p refs

(Grant NGL-04-001-007)

(NASA-CR-140671) Avail: NTIS HC $3.75 CSCL 20D

An experimental method for determinating the flow tracing fidelity of a scattering aerosol used in laser Doppler velocimeters was developed with particular reference to the subsonic turbulence measurements. The method employs the measurement of the dynamic response of a flow seeding aerosol excited by acoustic waves. The amplitude and frequency of excitation were controlled to simulate the corresponding values of fluid turbulence components. Experimental results are presented on the dynamic response of aerosols over the size range from 0.1 to 2.0 microns in diameter and over the frequency range 100 Hz to 100 kHz. It was observed that unit density spherical scatterers with diameters of 0.2 microns followed subsonic air turbulence frequency components up to 100 kHz with 98 percent fidelity. Author

N75-10358*# Flow Research, Inc., Kent, Wash.

A VISCOUS/POTENTIAL FLOW INTERACTION ANALYSIS METHOD FOR MULTI-ELEMENT INFINITE SWEPT WINGS, VOLUME 1

F. A. Dvorak and F. A. Woodward Washington NASA Nov. 1974 91 p refs

(Contract NAS2-7048)

(NASA-CR-2476) Avail: NTIS HC $4.75 CSCL 20D

An analysis method and computer program have been developed for the calculation of the viscosity dependent aerodynamic characteristics of multi-element infinite swept wings in incompressible flow. The wing configuration consisting at the most of a slat, a main element and double slotted flap is represented in the method by a large number of panels. The inviscid pressure distribution about a given configuration in the normal chord direction is determined using a two dimensional potential flow program employing a vortex lattice technique. The boundary layer development over each individual element of the high lift configuration is determined using either integral or finite difference boundary layer techniques. A source distribution is then determined as a function of the calculated boundary layer displacement thickness and pressure distributions. This source distribution is included in the second calculation of the potential flow about the configuration. Once the solution has converged (usually after 2-5 iterations between the potential flow and boundary layer calculations) lift, drag, and pitching moments can be determined as functions of Reynolds number. Author

N75-10359*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

A COMPUTING METHOD FOR SOUND PROPAGATION THROUGH A NONUNIFORM JET STREAM

Sharon L. Padula and Chen-Huei Liu Dec. 1974 19 p refs

(NASA-TM-X-71941) Avail: NTIS HC $3.25 CSCL 20D

Understanding the principles of jet noise propagation is an essential ingredient of systematic noise reduction research. High speed computer methods offer a unique potential for dealing with complex real life physical systems whereas analytical solutions are restricted to sophisticated idealized models. The classical formulation of sound propagation through a jet flow was found to be inadequate for computer solutions and a more suitable approach was needed. Previous investigations selected the phase and amplitude of the acoustic pressure as dependent variables requiring the solution of a system of nonlinear algebraic equations. The nonlinearities complicated both the analysis and the computation. A reformulation of the convective wave equation in terms of a new set of dependent variables is developed with a special emphasis on its suitability for numerical solutions on fast computers. The technique is very attractive because the resulting equations are linear in nonwaving variables. The computer solution to such a linear system of algebraic equations may be obtained by well-defined and direct means which are conservative of computer time and storage space. Typical examples are illustrated and computational results are compared with available numerical and experimental data. Author

N75-10360*# Chrysler Corp., New Orleans, La. Data Management Services.

RESULTS OF AN INVESTIGATION OF HYPERSONIC VISCOUS INTERACTION EFFECTS ON AN 0.01 SCALE SPACE SHUTTLE ORBITER 51-0 MODEL IN THE AEDC-VKF HYPERVELOCITY WIND TUNNEL Space Shuttle Aerothermodynamic Data Report

D. J. Elder (Rockwell International Corp.) Oct. 1974 69 p refs

(Contract NAS9-13247)

(NASA-CR-134423; DMS-DR-2152) Avail: NTIS HC $4.25 CSCL 20D

The major hypersonic aerodynamic results obtained experimentally from the 0.010-scale (51-0) 140A/B Orbiter vehicle are presented. The test was conducted over an angle-of-attack range from 20 to 35 degrees for nominal Mach numbers of 16 and 20. The Mach 16 data were obtained at Reynolds numbers, based on model length, of nominally 540,000 and 1.18 million. The Mach number 20 data were obtained at nominal Reynolds numbers of 80,000 and 270,000. Various elevon deflections and body flap deflections were tested for determination of control effectiveness. The test objectives were: (1) verify December 1973 Aerodynamic Design Data Book estimates for free stream greater than Mach 10; (2) determine configuration forward and aft trim boundaries and control characteristics; (3) determine high Mach number - low Reynolds number effects; and (4) determine if positive control surface flow separation is present and magnitude of separation effects. Author

N75-10361# McDonnell-Douglas Corp., St. Louis, Mo. Flight Sciences Dept.

PERFORMANCE AND EXIT DISTORTION OF DIFFUSERS AS DETERMINED BY FORCE MEASUREMENTS

M. Sajben, J. C. Kroutil, and A. V. Sedrick 8 Jan. 1974 51 p refs Backup document for AIAA Synoptic scheduled for publication in the AIAA Journal in May 1975

Avail: NTIS HC $4.25

Axial and lateral forces corresponding to the integrated exit impulse were measured on nine conical diffusers at low subsonic speeds. Static pressure rise, total pressure loss, and an exit impulse coefficient were determined and interrelated. The exit impulse coefficient contains information concerning momentum change in the diffuser and can be used as a substitute for the static pressure rise coefficient. The exit impulse is closely related to the nonuniformity of flow at the diffuser exit station and can be used as a distortion index. The force indication is instantaneous, which makes the method suitable for the investigation of dynamic processes. The determinations are not significantly affected by flow complexities such as separation and three-dimensionality. Author

N75-10362# McDonnell-Douglas Corp., St. Louis, Mo. Flight Sciences Dept.

GENERATION OF VELOCITY PROFILES USING SCREENS OF NONUNIFORM SOLIDITY

Miklos Sajben, J. C. Kroutil, G. H. Hoffman, and A. V. Sedricr 29 Mar. 1974 56 p refs Backup document for AIAA Synoptic scheduled for publication in the AIAA Journal in Apr. 1975

Avail: NTIS HC $4.25

The generation of arbitrary axisymmetric velocity profiles is described. Plane screens of variable solidity, fabricated by electroplating a uniform screen in a rotating apparatus were used in a wide range of screen mesh sizes, permitting control of the overall turbulent intensity. Velocity profiles measured behind seven different screens are presented, and design velocity distributions are compared. Turbulent intensities and integral length scales of turbulence were measured for uniform screens ranging in mesh size from 5 to 105 in. Author

N75-10363# Grumman Aerospace Corp., Bethpage, N.Y. Research Dept.

SELF-EXCITED SUPERTURBULENCE: THE WHISTLER NOZZLE

William G. Hill, Jr. and Peter R. Greene Oct. 1974 40 p refs (RE-488) Avail: NTIS HC $3.75

A device, capable of greatly increasing subsonic jet mixing rates, has been discovered. This device, consists of a convergent nozzle section, a constant area section, and a step change to an exit section with a larger constant area. The exit section excites a standing acoustic wave in the constant area section, in a way similar to the action of an organ pipe. The result of this resonance is a loud pure tone and a greatly increased rate of jet mixing. The increased mixing rates appear related to the acoustically stimulated vortex shedding character (superturbulence) observed in a study of jets excited by a loudspeaker, except that the nozzle is self-excited, and produces much greater velocity fluctuations. The standing wave and the resulting increased mixing rates occur for a wide range of exit plane configurations and jet parameters. Author

N75-10364# STD Research Corp., Pasadena, Calif.

TWO-DIMENSIONAL FLOW INSIDE MHD DUCTS WITH TRANSVERSE ASYMMETRIES

E. D. Doss, G. S. Argyropoulos, and S. T. Demetriades 23 Oct. 1973 34 p refs Backup document for AIAA Synoptic scheduled for publication in the AIAA Journal in May 1975

(Contract NSF C-727)

Avail: NTIS HC $3.75

The compressible turbulent flow of seeded plasma in a magnetohydrodynamic (MHD) channel is analyzed by a two-dimensional formulation that accounts for pressure gradients normal to the walls, induced by the presence of Hall currents. Solution of the equations of motion (that include the y-momentum equation, and the electron continuity and energy equations) is obtained by an implicit finite difference scheme that avoids separate consideration of an inviscid core and two boundary layer regions; instead, all the unknowns of the problem, including the gas-dynamic pressure, are determined across the entire channel at every numerical step taken in the streamwise direction. Applications to MHD channels of current interest show that the Hall component of the current density if sufficiently large, can cause asymmetrics in the mean gas velocity profile and the other gasdynamic profiles. Also, if the retarding force is high enough for flow separation to occur, the presence of Hall currents causes separation to occur sooner on one or the other channel wall. Author

N75-10365# Max-Planck-Institut fuer Plasmaphysik, Garching (West Germany).

ONE-DIMENSIONAL EQUATIONS FOR MHD CHANNEL FLOWS

J. Raeder, G. Zankl, and R. Bunde 29 Oct. 1974 39 p refs Backup document for AIAA Synoptic Scheduled for publication in the AIAA Journal in May 1975

Avail: NTIS HC $3.75

On the basis of the three-dimensional equations for stationary magnetogasdynamics one-dimensional equations for channel flows are derived by volume integration. The analysis shows that the commonly used one-dimensional equations are valid for a special set of mean flow parameters. The definitions of these mean values result from the theoretical derivation in a straight-forward manner. The general results are specialized for channel flows which allow subdivision into core and boundary layers. This type is characteristic of most MHD applications. Finally, a typical flow in an MHD generator channel is treated theoretically with the equations derived before. Comparison with measured distributions shows good agreement. Author

N75-10366*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

AN IMPROVED HEAT EXCHANGER Patent Application

Roy F. Holmes (Gen. Dyn./Convair, San Diego, Calif.) and Edward E. Keller, inventors (to NASA) (Gen. Dyn./Convair, San Diego, Calif.) Filed 5 Nov. 1974 15 p Sponsored by NASA (NASA-Case-MFS-22991-1; US-Patent-Appl-SN-521006) Avail: NTIS HC $3.25 CSCL 20M

An improved lightweight heat exchanger is described particularly suited for use in systems having low volume flow, high longitudinal gradient and high effectiveness requirements. The heat exchanger is characterized by a shell of an annular configuration, an endless plate of minimal thickness, and substantially uniform convoluted configuration within the annular shell. A pair of manifolds disposed 180 degrees apart is mounted on the shell in communication with the passages through which counterflowing fluids having different temperatures are simultaneously introduced and extracted from the passageways for achieving a continuous transfer of heat through the convoluted plate. NASA

N75-10367# European Space Research Organization, Paris (France).

AEROSPACE RESEARCH Bimonthly Bulletin No. 1973-5

Apr. 1974 123 p refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel No. 1973-5, ONERA, 1973 (ESRO-TT-40) Avail: NTIS HC $5.25; ONERA, Paris 20 F

Topics in aerospace research are presented. They include theoretical and experimental performance of a dual mode ramjet for the Mach 3.5 to 7 domain of flight velocities, time dependent methods for computing wall effects in two-dimensional supercritical flow, analog (rheoelectrical) simulation of the small perturbation equation for transonic flows, determination of the dynamic characteristics of an aircraft structure, and a piston unit for rate modulation of a liquid propellant flow. For individual titles, see N75-10368 through N75-10372.

N75-10368 European Space Research Organization, Paris (France).

DUAL MODE RAMJET THEORETICAL AND EXPERIMENTAL PERFORMANCE FOR MACH 3.5 TO 7 DOMAIN OF FLIGHT VELOCITIES **c20**

Pierre Contensou, Roger Marguet, Charles Huet et al *In its* Aerospace Res. (ESRO-TT-40) Apr. 1974 p 1-33 refs Transl. into ENGLISH from La Rech. Aerospatiable, Bull. Bimestriel No. 1973-5, ONERA 1973, p 259-274 (For availability see N75-10367 01-34)

A dual-mode ramjet (one in which transonic and supersonic combustion occur in the same chamber) to propel hypersonic vehicles up to velocities of Mach 6 or 7 is considered. In theory, this configuration makes it possible to obtain performances close to those of a continuously adapted ramjet while retaining a fixed geometry for the air intake and the nozzle for the entire mission. The results of experimental studies carried out in a high-enthalpy wind tunnel on a 400-mm-diam ramjet under flight conditions approaching Mach 6 are cited, noting that specific impulses of the order of 3000 sec were obtained. A method of optimizing the combustion in a fixed-geometry ramjet by varying the combustion regime is described. Author (ESRO)

N75-10369 European Space Research Organization, Paris (France).

TIME-DEPENDENT METHODS FOR COMPUTING WALL EFFECTS IN TWO-DIMENSIONAL SUPERCRITICAL FLOW **c02**

Pierre Laval *In its* Aerospace Res. (ESRO-TT-40) Apr. 1974 p 34-66 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel No. 1973-5, ONERA 1973, p 275-288 (For availability see N75-10367 01-34)

Two time-dependent methods are developed to compute supercritical flow over an airfoil in a wind tunnel test section with solid or perforated walls. In the first method, the exact unsteady equations are solved by means of a difference scheme similar to a Richtmyer scheme. In the second method, which is an offspring of the time splitting method of MacCormack and Paullay, the unsteady two-dimensional equations are split into one-dimensional equations which are solved by means of the MacCormack scheme. Results are presented for supercritical flows over a NACA 0012 airfoil and two biconvex airfoils. Author (ESRO)

N75-10370 European Space Research Organization, Paris (France).

ANALOG SIMULATION OF THE SMALL PERTURBATION EQUATION APPLIED TO TRANSONIC FLOWS **c02**

Georges Gaubert *In its* Aerospace Res. (ESRO-TT-40) Apr. 1974 p 67-93 refs Transl. into ENGLISH from La Rech.

Aerospatiale, Bull. Bimestriel No. 1973-5, ONERA 1973, p 289-299 (For availability see N75-10367 01-34)

The small perturbation equation is simulated by a resistive network in which resistor units whose resistance is variable with the applied voltage represent the nonlinear term. These units are made of elements (diodes and resistors) associated with integrated operational amplifiers. A visualization system displaying the profile, local slopes, velocity, and perturbation potential distributions, makes it possible to know without delay the evolution tendency of the various parameters. The method, validated, was applied to flows along walls and around cascades. Author (ESRO)

N75-10371 European Space Research Organization, Paris (France).

DETERMINATION OF THE DYNAMIC CHARACTERISTICS OF A STRUCTURE FROM A VIBRATION TEST PERFORMED WITH ONLY ONE EXCITATION POINT c05

Rolland Dat *In its* Aerospace Res. (ESRO-TT-40) Apr. 1974 p 94-109 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel No. 1973-5, ONERA 1973, p 301-306 (For availability see N75-10367 01-34)

A method is described which permits the determination of the matrix of transfer functions from a vibration test performed with only one excitation point. It is based on the theory of linear discrete systems and utilizes a least squares procedure to obtain the rational fraction which fits best with the measured transfer functions. The coefficients defining the complete transfer matrix are obtained after separation into partial fractions. The validity of the method is illustrated by examples of application to aircraft structures. Author (ESRO)

N75-10372 European Space Research Organization, Paris (France).

PISTON UNIT FOR RATE MODULATION OF A LIQUID FLOW

Jean-Jacques Dordain, Michel Marchetti et al *In its* Aerospace Res. (ESRO-TT-40) Apr. 1974 p 110-119 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel No. 1973-5, ONERA1973, p 307-310 (For availability see N75-10367 01-34)

In the device, the discharge rate of the liquid is controlled by the displacement of a piston which is mounted in such a way that its axis is perpendicular to the flow direction. Design details of the control device are presented together with information concerning the operation of the device under the specific conditions investigated. The variation in pressure fluctuation amplitude as a function of frequency is shown in a graph. Author (ESRO)

N75-10373# Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science.

RESEARCH ON TURBULENT DIFFUSION Final Report

S. Corrsin 16 Mar. 1974 12 p

(Contract AT(11-1)-3284)

(COO-3284-3) Avail: NTIS HC $3.25

The principal research problems pursued under this contract were (1) experiments on a nearly homogeneous turbulent shear flow, (2) experiments on diffusion of scalar contaminant in isotropic turbulence, (3) experiments on diffusion of scalar contaminant in a turbulent boundary layer, (4) computer modeling of diffusion in both isotropic turbulence and homogeneous turbulent shear flow, (5) theoretical analysis of fluid material line growth in homogeneous turbulence, and (6) preliminary experimental and theoretical studies of the propagation of a concentration interface across an isotropic turbulence. Summaries of some of the results are given. NSA

N75-10374# European Space Research Organization, Paris (France).

THE INFLUENCE OF AERODYNAMIC PARAMETERS ON THE RATE OF EROSION RATE CAUSED BY THE IMPACT OF A LIQUID DROPLET AT THE STAGNATION POINT OF A BODY FLYING AT SUPERSONIC SPEED

Wolfgang Koerner Sep. 1974 60 p refs Transl. into ENGLISH of Der Einfluss der aerodynamischen Parameter auf die Erosionswirkung eines Regenetropfens beim Aufprall am Staupunkt eines mit Ueberschallgeschwindigkeit bewegten Flugkoerpers, DLR-FB-73-77, DFVLR, 8 Jun. 1973 (ESRO-TT-86; DLR-FB-73-77) Avail: NTIS HC $4.25; DFVLR, Porz, West Ger. 19,20 DM

When a body flying at supersonic speed approaches a liquid droplet, the latter, before impinging at the stagnation point, is exposed to the flow field in front of the body. Approximate formulae are given for the velocity and shape of the droplet at the instant of impact at the stagnation point of the flying body. Based on energy considerations, a formula was derived which is proportional to the expected erosion rate caused by the impact of a deformed droplet. Formulae are presented for the rate of erosion in terms of dimensionless quantities describing the flight conditions. Author (ESRO)

N75-10375# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.

MEASUREMENTS IN A TURBULENT HORSESHOE VORTEX AND THE PROBLEM OF PROBE INTERFERENCE

O. O. Mojola Dec. 1973 73 p refs

(Grant SRC-B/SR/8978)

(IC-Aero-73-08) Avail: NTIS HC $4.25

The results of a detailed experimental investigation into the behavior of a turbulent flow in the central plane of a highly-divergent three-dimensional boundary layer, designed to simulate the flow upstream of an isolated building embedded in the atmospheric boundary layer, or a wing-body junction, are presented. The measurements, which include surface flow visualization, mean velocity profiles, static pressure profiles and flow angles, reveal the presence of a recirculation region which is intolerably sensitive to the presence of pressure probes. Therefore, the results obtained with pressure probes within the flow must be regarded as only semi-quantitative in and near the recirculation region. It follows that laser-doppler or particle-tracing techniques are essential for reliable measurements in this sort of flow. Author (ESRO)

N75-10376# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.

ON THE MEASUREMENT OF INTERMITTENCY IN TURBULENT FLOW

P. Bradshaw and J. Murlis Mar. 1974 22 p refs Supersedes IC-Aero-TN-73-108

(Grant SRC-B/SR/7377)

(IC-Aero-74-04; IC-Aero-TN-73-108) Avail: NTIS HC $3.25

The following aspects of intermittency in a turbulent flow are discussed: (1) the turbulent/irrotational interface is highly re-entrant; (2) any simple velocity function which is supposed to be positive within the turbulence will in fact have occasional zeroes; and (3) such turbulence criterion function may respond to high wave number intermittency as well as interfacial intermittency. These three problems lead to the prediction of short irrotational regions within a turbulent burst. The usual practice of rejecting all such short regions suppresses the genuine consequences of a re-entrant interface. ESRO

N75-10377# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.

MEASUREMENTS OF TURBULENT BOUNDARY LAYER GROWTH OVER A LONGITUDINALLY CURVED SURFACE

R. N. Meroney (Colo. State Univ.) Jan. 1974 78 p refs Sponsored in part by the US Environ. Protect. Agency

(Contract MIN-DEF/PE-AT/2037/0102)

(IC-Aero-74-05) Avail: NTIS HC $4.75

Measurements are presented of mean and fluctuating quantities in the turbulent boundary layers on the concave and convex walls of a curved duct, the radius of curvature being of the order of 100 times the boundary layer thickness in each case. Curvature of this magnitude causes changes in surface shear stress of about 10 percent with corresponding changes in Reynolds stresses. Longitudinal vortices occurring on the concave wall are briefly documented. Author (ESRO)

N75-10378*# Loughborough Univ. of Technology (England). Dept. of Transport Technology.

PROPAGATION OF WAVES IN ELLIPTIC DUCTS. A THEORETICAL STUDY

S. Baskaran Feb. 1974 174 p refs Sponsored in part by NASA and Natl. Gas Turbine Estab.

(NASA-CR-140652; TT-7403) Avail: NTIS HC $6.25 CSCL 20D

The cut-off frequencies for high order circumferential modes were calculated for various eccentricities of an elliptic duct section. The problem was studied with a view to the reduction of jet engine compressor noise by elliptic ducts, instead of circular ducts. The cut-off frequencies for even functions decrease with increasing eccentricity. The third order eigen frequencies are oscillatory as the eccentricity increases for odd functions. The eigen frequencies decrease for higher order odd functions inasmuch as, for higher orders, they assume the same values as those for even functions. Deformation of a circular pipe into an elliptic one of sufficiently large eccentricity produces only a small reduction in the cut-off frequency, provided the area of the pipe section is kept invariable. ESRO

N75-10379# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Dynamik Verduennter Gase.

SCATTERING OF BACKGROUND MOLECULES IN FREE JET EXPANSIONS STUDIED BY FREE MOLECULAR FLAT PLATE DRAG MEASUREMENTS

H. Legge and P. Raghuraman 1974 36 p refs (Contract WU-50/16)
(DLR-FB-74-16) Avail: NTIS HC $3.75; DFVLR, Porz, West Ger. 12,60 DM

The background scattering in a highly rarefied hypersonic free jet is studied, theoretically and experimentally. A free molecular flat plate placed parallel to the flow direction is used as the tool for these investigations. The drag of the flat plate is studied as a function of the background pressure in the free jet. Author (ESRO)

N75-10380# Cambridge Univ. (England). SRC Turbomachinery Lab.

FREE-STREAM TURBULENCE EFFECTS ON THE TURBULENT BOUNDARY LAYER

R. L. Evans London Aeron. Res. Council 1974 49 p refs Supersedes ARC-34586
(ARC-CP-1282; ARC-34586) Avail: NTIS HC $3.75; HMSO 80p; PHI $3.35

The results of an experimental investigation of the effects of free stream turbulence on a constant pressure turbulent boundary layer are presented. An increase in the fullness of the velocity profile with a consequent decrease in displacement and momentum thickness and an increase in skin friction is found with increasing free stream turbulence level. Measurements of some of the turbulence structural properties show an increase in the turbulence kinetic energy and the turbulent shear stress throughout the boundary layer with increasing free stream turbulence. The turbulent shear stress was found to persist into the free stream, well beyond the usual edge of the boundary layer. Author (ESRO)

N75-10381# Salford Univ. (England). Fluid Mechanics Computation Centre.

A SHOCK CAPTURING METHOD FOR CALCULATING SUPERSONIC FLOW FIELDS

F. Walkden and P. Caine London Aeron. Res. Council 1974 43 p refs Supersedes ARC-34161
(ARC-CP-1290; ARC-34161) Avail: NTIS HC $3.75; HMSO 75p; PHI $3.15

A finite difference representation of equations that govern the steady supersonic three dimensional flow of an inviscid ideal gas with constant specific heats is described. A method of using the finite difference equations to calculate solutions of mixed initial and boundary value problems associated with supersonic flow fields is explained. The finite difference equations are arranged so that shock waves that occur in a flow field are computed automatically. Across computed shock waves, the dependent variables change rapidly but the changes cannot be regarded as discontinuous. Numerical results for a symmetric delta wing at zero incidence in a uniform mainstream flow are presented. These results are compared with results from a numerical characteristic method. Author (ESRO)

N75-10382# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.

INFLUENCE OF THE SIDE WALLS ON THE TURBULENT CENTRE-PLANE BOUNDARY LAYER IN A SQUARE DUCT

V. deBrederode and P. Bradshaw May 1974 63 p refs (Contracts AT/2037/0102; AT/2037/0141)
(IC-Aero-74-06) Avail: NTIS HC $4.25

Measurements in the entry region of a square duct show that the effect of true secondary flow (streamwise vorticity originating near the corners) on the center-plane boundary layer is negligible for boundary layers thinner than about one-fourth of the duct width. Effects of collinear lateral convergence on the turbulence structure are significant but can be satisfactorily represented in a boundary layer calculation method. Because these effects and the effects of pressure gradient oppose one another the mean velocity profiles and surface shear stress in the duct are quite close to those on a flat plate. The results are relevant to the design of test rigs for boundary layer research. Author (ESRO)

N75-10383# European Space Research Organization, Paris (France).

CALCULATION OF THE PLANE SUPERSONIC FLOW THROUGH CASCADES USING THE METHOD OF ANALYTICAL CHARACTERISTICS

Hanns-Juergen Lichtfuss Jun. 1974 114 p refs Transl. into ENGLISH of Berechnung der ebenen Ueberschallgitterstroemung mit Hilfe des anal. Charakteristikenverfahrens, DLR-FB-73-34, DFVLR, 16 Feb. 1973
(ESRO-TT-78; DLR-FB-73-34) Avail: NTIS HC $5.25; DFVLR, Porz, West Ger. 36,20 DM

Irrotational two dimensional supersonic flow through straight cascades were calculated using analytical method of characteristics. Different flow configurations were observed with the axial components of the inlet or outlet flow under subsonic or supersonic conditions. Neutral inlet and outlet characteristics were calculated as well as the asymptotic value of shocks in front or downstream of the lattice rows. Entropy changes due to the infinite number of cascade shocks were also obtained. Author (ESRO)

N75-10384# European Space Research Organization, Paris (France).

SECOND ORDER BOUNDARY LAYER THEORY FOR STEADY, LAMINAR, COMPRESSIBLE FLOW ON CURVED SURFACES

Roger Grundmann Sep. 1974 79 p refs Transl. into ENGLISH of Grenzschichttheorie zweiter Ordnung fuer stationaere, laminare, kompressible Stroemungen an gekruemmten Oberflaechen, DLR-FB-73-31, DFVLR, 12 Jan. 1973
(ESRO-TT-85; DLR-FB-73-31) Avail: NTIS HC $4.25; DFVLR, Portz, West Ger. 26,10 DM

A system of equations was derived by the method of magnitude analysis for calculating steady, laminar, compressible flow and thermal boundary layers on curved two dimensional surfaces and surfaces of rotation. This corresponds to a second order boundary layer theory and contains information about the pressure gradient normal to the surface. The equations were made discrete in the flow direction and a finite difference method applied to the other direction. No similarity solutions being sought, the laminar separation point may be calculated for particular shapes. Author (ESRO)

N75-10385# European Space Research Organization, Paris (France).

A MULTI-PARAMETER INTEGRAL METHOD FOR THE CALCULATION OF INCOMPRESSIBLE LAMINAR AND TEMPERATURE BOUNDARY LAYERS

Burkhard Schulz-Jander Sep. 1974 75 p refs Transl. into ENGLISH of Ein mehrparametriges Integralverfahren zur Berechnung von laminaren u. turbulenten inkompressiblen Stromungs- u. Temperaturgrenzschichten, DLR-FB-73-24, DFVLR, 1973
(ESRO-TT-88; DLR-FB-73-24) Avail: NTIS HC $4.25; DFVLR, Porz, West Ger. 20,40 DM

A method is developed for calculating the flow and temperature distribution for conditions of incompressible laminar flow on the basis of two integral relations for each case. In the case of turbulent flow calculations, an integral of the heat exchange rate in the boundary layer is determined from available experimental results and an approximation formula for the integral is also given. Sample calculations and comparison with other experimental data show that the method yields reliable results for flow

with strong pressure and/or temperature gradients in the flow direction even when the effective Prandtl number varies significantly within the boundary layer. Author (ESRO)

N75-10386# European Space Research Organization, Paris (France).
DRAG MEASUREMENTS ON PLATES PARALLEL TO THE FLOW, AND ON DISCS PERPENDICULAR TO THE FLOW, IN SUPERSONIC HIGHLY RAREFIED FREE JETS
H. Legge Sep. 1974 105 p refs Transl. into ENGLISH of Widerstandsmessungen an parallel angestroemten Platten u. senkrecht angestroemten Scheiben in Ueberschallfreistrahlen grosser Verduennung, DLR-FB-73-17, DFVLR, 1973
(ESRO-TT-91; DLR-FB-73-17) Avail: NTIS HC $5.25; DFVLR, Porz, West Ger. 33,30 DM

Drag measurements were carried out on plates parallel to the flow, and on discs perpendicular to the flow, in a hypersonic wind tunnel facility. The flow field of the rarefied free jet was examined by measurements on the plate parallel to the free molecular flow, especially the effect of the background molecules and the freezing effects. The test results are compared with the results obtained from theoretical investigations. The drag coefficient of the disc perpendicular to the flow was determined over the whole range from free molecular flow to continuum flow. This was achieved by carrying out measurements in a rarefied free jet, in an isentropic free jet, and a conical nozzle. Author (ESRO)

N75-10387# European Space Research Organization, Paris (France).
INFLUENCE OF THE VISCOUS INTERACTION PARAMETER ON THE AERODYNAMIC COEFFICIENTS AND ON THE HEAT TRANSFER OF A REENTRY BODY AT VERY LOW DENSITIES FOR THE WHOLE REGION OF ANGLE OF ATTACK
Farouk Bachour, E. Weber et al 31 Oct. 1973 38 p refs Transl. into ENGLISH of Einfluss des viskosen Wechselwirkungsparameters auf die aerodynamischen Beiwerte sowie auf den Waermeuebergang eines Wiedereintrittskoerpers bei sehr geringen Dichten im gesamten Anstellwinkelbereich, DLR-FB-73-119, DFVLR, 31 Oct. 1973
(ESRO-TT-95; DLR-FB-73-119) Avail: NTIS HC $3.75; DFVLR, Porz, West Ger. 15 DM

Force and moment measurements at a space shuttle orbiter model are described. The results are compared with theoretical and experimental data from the near continuum regime. Measurements of the surface temperature, using a non-flow disturbing infrared camera, are discussed. The transition flow at the model is characterized by parameter of viscous interactions 0.42-0.93, Mach number 12.8-15, Reynolds number 91-24/cm and mean free path 2.1-9.3 mm. The angle of attack ranged from 0 to 65 deg. ESRO

N75-10388# Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.
ACCURACY OF HOMOGENEOUS NUCLEATION RATES DETERMINED IN SUPERSONIC NOZZLES
Joseph A. Clumpner Jun. 1974 20 p refs
(Contract N00014-67-A-0097-0012)
(AD-784506; TR-27) Avail: NTIS CSCL 20/4

Accurate homogeneous nucleation rate values have been obtained by studying the condensation of ethyl alcohol in a supersonic nozzle. The effects of data uncertainties have been made small by carefully developed experimental techniques, so that the calculated homogeneous nucleation rates are accurate to within one order of magnitude. On the other hand, various theoretical predictions for nucleation rates differ from each other by many orders of magnitude. Therefore, condensation data obtained from supersonic nozzle experiments can be very useful for judging the validity of different nucleation theories. GRA

N75-10389# Massachusetts Univ., Amherst. School of Engineering.
EXPERIMENTAL DETERMINATION OF HYDRODYNAMIC MASS EFFECTS
Alfred J. Ciesluk and Joseph M. Colonell Apr. 1974 81 p refs
(Contract N00014-68-A-0146; NR Proj. 200-016)
(AD-781910; UM-74-1) Avail: NTIS CSCL 13/10

An experimental investigation was undertaken to determine the hydrodynamic mass effects of various simple geometric shapes with emphasis being placed upon right circular cylinders. By oscillating models in simple harmonic motion, the excess force required to produce this motion in water was measured for comparison with the force necessary to produce the same motion in air, yielding information that is necessary to determine hydrodynamic mass coefficients. A dependence of the hydrodynamic mass coefficients upon frequency and amplitude of oscillation was investigated along with the effects of the proximity of a free surface. (Modified author abstract) GRA

N75-10390# Purdue Univ., Lafayette, Ind. Project SQUID Headquarters.
SUMMARY OF THE LASER RAMAN WORKSHOP ON THE MEASUREMENT OF GAS PROPERTIES
Marshall Lapp and C. M. Penney Jun. 1974 19 p Prepared in cooperation with General Electric Co., Schenectady, N. Y.
(Contract N00014-67-A-0226-0005; NR Proj. 098-038)
(AD-782562; SQUID-TR-GE-2-PU) Avail: NTIS CSCL 07/4

The report briefly describes and comments upon the Laser Raman Workshop on the measurement of Gas Properties, held at the General Electric Research and Development Center on May 10 and 11, 1973. The purpose of the Workshop was to explore and assess the application of Raman scattering techniques to the measurement of the state properties of gases, with a general focus upon fluid mechanic and combustion processes. A list of papers is included. GRA

N75-10391# Office of Naval Research, London (England).
EUROMECH 46: NUMERICAL AND EXPERIMENTAL INVESTIGATIONS OF THE STABILITY OF BOUNDARY LAYERS
Harold G. Elrod 29 May 1974 23 p
(AD-783568; ONRL-R-2-74) Avail: NTIS CSCL 20/4

A summary is given of papers presented at Euromech 46, a conference on boundary-layer stability, for which no proceedings will be issued. GRA

N75-10392# Naval Ordnance Lab., White Oak, Md.
A STUDY OF THE EFFECT OF PRESSURE GRADIENT ON THE EDDY VISCOSITY AND MIXING LENGTH FOR INCOMPRESSIBLE EQUILIBRIUM TURBULENT BOUNDARY LAYERS
W. J. Glowacki and S. W. Chi 30 May 1974 114 p refs
(AD-783942; NOLTR-74-105) Avail: NTIS CSCL 20/4

Shear stress, eddy viscosity, and mixing length distributions corresponding to five two-dimensional, incompressible equilibrium turbulent boundary layers were calculated by substituting measured velocity profile data into the governing equations. The five flows cover the range from moderate adverse pressure gradient to strong favorable pressure gradient. (Modified author abstract) GRA

N75-10393# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FLOW OF A TWO PHASE MEDIUM WITH SOLID PARTICLES AROUND A THIN PROFILE
N. A. Manadaliev and Kh. A. Rakhmatulin 1 Jul. 1974 12 p refs Transl. into ENGLISH from the book "Volny v Neuprugikh Sredakh" Kishinev, 1970 p 146-152
(AD-783571; FTD-HT-23-1474-74) Avail: NTIS CSCL 20/4

In the report is offered a model of the flow of a two-phase medium around a thin profile with consideration of the effect of the reflection of particles from the profile's surface. A solution is given to certain linearized problems with various hypotheses relative to the volume occupied by the particles and the friction between the phases. GRA

N75-10394# Naval Postgraduate School, Monterey, Calif.
A RATIONAL BASIS FOR CIRCUMFERENTIAL DISTORTION INDEX FORMULATION M.S. Thesis
Charles Patrick Downs Jun. 1974 71 p refs
(AD-783819) Avail: NTIS CSCL 13/7

NASA has recently published data on the effects of temperature and pressure distortion on the stability of axial-flow compressors. Theoretical predictions of compressor instability

based on vorticity do not explain the observed compressor stability of the NASA tests. Description of distorted flow by vorticity is extended by a simplified model which incorporates vortex sheets and influence coefficients. To determine the upstream influence of the compressor on flow field distortion, a model using parallel compressor theory, experimental data from NASA and a pressure ratio equation derived by Hill and Peterson is formulated. The model correctly predicts compressor blade loading calculated by Carta. This new model accounts for upstream effects of the compressor and shows that the vorticity model by itself is incomplete. Incorporation of the new model into a distortion index based on radial vorticity and total pressure change is proposed and discussed. Author (GRA)

N75-10395# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE INFLUENCE OF MAGNETIC FIELD ON TURBULENT FLOW WITH A SHIFT
G. N. Abramovich, D. S. Kovner, A. Ya. Kolpakov, and V. G. Lushchik 15 Aug. 1974 18 p refs Transl. into ENGLISH from Magn. Gidrodin. (USSR), no. 1, Jan./Mar. 1973 p 19-25
(AF Proj. 317J)
(AD-784702; FTD-HT-23-1117-74) Avail: NTIS CSCL 20/4

With the help of a modificaton of the Prandtl formula, considering the effect of a magnetic field of various orientation on a flow, an analytical and numerical solution was obtained for the problem concerning the turbulent flow close to a solid wall in tubes with a flat and circular cross section, and also in the jet layer of shifting. GRA

N75-10396# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Mechanical Engineering.
CONTAMINATION EFFECTS IN A LAMINAR PROPORTIONAL AMPLIFIER Final Report
R. A. Comparin, Hal L. Moses, and Eugene E. Rowell, III Jun. 1974 69 p
(Contract DAAG39-73-C-0175; DA Proj. 1T1-61102-A-33-B)
(AD-782244; HDL-175-1) Avail: NTIS CSCL 13/7

Contamination of a fluidic device is defined as the buildup of deposits on the internal surfaces of the device. The contaminants are carried into the device by the fluid used to operate it. A laminar proportional amplifier was tested with a contaminated power supply to determine the nature and location of contaminant deposits and their effect upon the performance of the device. Gain curves and photographs of the deposits were obtained to establish a time history of the contamination effects. The results show that contamination can cause changes in gain, pressure recovery and null point. Also, severe inlet plugging can occur with a simple right-angle power supply entry and rapid outlet plugging occurs with a low aspect ratio. A detailed summary of the results is presented together with some recommended geometrical changes to reduce sensitivity to contamination. Author (GRA)

N75-10397# Naval Ordnance Lab., White Oak, Md.
ANALYTICAL PROCEDURES USED TO OBTAIN AND EVALUATE THE EDDY VISCOSITY AND MIXING LENGTH EXTRACTED FROM INCOMPRESSIBLE TURBULENT BOUNDARY LAYER DATA
W. J. Glowacki 30 May 1974 80 p refs
(ZR0000101)
(AD-784416; NOLTR-74-106) Avail: NTIS CSCL 20/4

Results of a study on the effect of freestream pressure gradient on the eddy viscosity and mixing length for incompressible equilibrium turbulent boundary layers were presented in a separate report. The present report describes in detail the analytical procedures used to obtain those results. A procedure is discussed for extracting shear stress, eddy viscosity, and mixing length distributions from experimental velocity profile data. Also a simple turbulent boundary layer calculation procedure is presented which was used to verify and to evaluate the data. (Modified author abstract) GRA

N75-10398# Colorado State Univ., Fort Collins. Fluid Dynamics and Diffusion Lab.
BOUYANCY EFFECTS ON A TURBULENT SHEAR FLOW
Robert N. Meroney Apr. 1974 108 p refs
(Contract N00014-68-A-0493-0001; Grant NSF GK-33800)
(AD-784438; CER73-74RNM38; THEMIS-ONR-TR-28) Avail: NTIS CSCL 20/4

Utilizing a simple time dependent one-dimensional example as a test case the report discusses a solution which represents the important characteristics of a buoyancy dominated shear flow by solving four partial differential equations in addition to the mean equations of motion. This suggested model solves equations for total turbulent kinetic energy, total turbulent temperature fluctuations, eddy dissipation, and thermal eddy dissipation. Three separate versions of this model are discussed. The final version replicates results for a much more complicated version. The advantages for two and three dimensional problems are even greater. (Modified author abstract) GRA

N75-10399# ARO, Inc., Arnold Air Force Station, Tenn.
NITROGEN CONDENSATION IN A SONIC ORIFICE EXPANSION FLOW Final Report, 1 Nov. 1972 - 31 Jul. 1973
J. W. L. Lewis, W. D. Williams, L. L. Price, and H. M. Powell AEDC Jul. 1974 46 p refs
(ARO Proj. VF233)
(AD-783254; ARO-VKF-TR-74-12; AEDC-TR-74-36) Avail: NTIS CSCL 07/4

Homogeneous condensation of nitrogen in hypersonic expansions from a sonic orifice source was investigated using both Rayleigh scattering and electron beam fluorescence diagnostics. Using a 3-mm orifice, the source pressure range of 100 to 4000 torr was investigated for a 300 K source temperature. Electron beam measurements of the rotational temperature, TR, of nitrogen were used to determine onset of condensation, and both radial and axial surveys of TR were performed. Rayleigh scattering measurements were used to observe both onset of condensation and growth of clusters along the centerline, and estimates of mole or mass fractions of condensate were obtained using both diagnostic techniques. Previously published supersaturation ratios of N2 are compared. (Modified author abstract) GRA

N75-10400# Virginia Univ., Charlottesville. Dept. of Engineering Science and Systems.
CONTRIBUTION OF A WALL SHEAR STRESS TO THE MAGNUS EFFECT ON NOSE SHAPES Final Report
Ira D. Jacobson Jun. 1974 12 p refs
(Contract DAAD05-72-C-0131; DA Proj. 1T1-61102-A-33D)
(AD-784145; ESS-3318-111-74; BRL-CR-166) Avail: NTIS CSCL 20/4

The effect of an asymmetric transition on wall shear stress is presented. It is shown that the Magnus force and moment can be substantially changed due to the shear stress contribution for the mixed boundary layer case on a spinning body. Comparison is made with the Magnus contributions due to pressure forces indicating the shear stress can account for as much as fifty percent or more of the total side force and moment. Some experimental data are analyzed to illustrate the trends predicted. Author (GRA)

N75-10013 European Space Research Organization, Paris (France).
METHODS OF VISUALIZING THE LEADING EDGE SEPARATION BUBBLE AND ANALYSIS OF THE RESULTS
Emile Erlich *In its* Aerospace Res. (ESRO-TT-90) Sep. 1974 p 41-53 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel No. 1973-4, 1973, p 219-223 (For availability see N75-10011 01-02)

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N75-10401 Mashinstoyeniye, Moscow (USSR).
DYNAMIC AND STATIC BALANCING GYROSCOPIC EQUIPMENT
M. P. Kovalev, S. P. Morzhakov, and K. S. Terekhova 1974 554 p refs In RUSSIAN
Copyright. Avail: Issuing Activity

Contemporary theory and technology are presented for the static and dynamic balancing of rotors and other units in gyroscopic apparatus, in terms of the effect of the quality of the pivoting base and other elements in relation to their accuracy and reliability. Results of investigations are presented for the dependence of gyroscope drift on the nonperpendicularity of the universal joint axes, on the dynamic imbalance of the internal wheel suspension, and on the dynamic imbalance in components and assemblies of the gyroscopic equipment. Calculation theory is considered for rigidity characteristics of the pivoting base and their effect on the gyroscope's operation. Various balancing machine systems are considered, and recommendations are presented for their calculation and utilization. Basic methods are indicated for automating the process of balancing gyroscope rotors. Author

N75-10402 Oregon State Univ., Corvallis.
DESIGN OF A MINI-COMPUTER CONTROLLED DIGITAL INTEGRATED CIRCUIT TESTER Ph.D. Thesis
Patrick Pad Fasang 1974 160 p
Avail: Univ. Microfilms Order No. 74-20566

The purpose of the thesis is to design, construct, program, and test an automatic integrated circuit test system. The class of integrated circuits tested was restricted to digital integrated circuits. The general concept of testing a digital integrated circuit is based on the truth table of that circuit. The tester consists of a matrix switch, power supplies, a clock, logic circuitry, analog-to-digital and digital-to-analog converters, and a PDP-8/L mini-computer with an automatic send-receive teletypewriter. With the exception of the minicomputer with its teletypewriter and power supplies, the tester was designed, constructed, programmed, and tested. Computer programs for testing some digital integrated circuits and their results of testing are shown. Dissert. Abstr.

N75-10403*# National Bureau of Standards, Boulder, Colo. Cryogenics Div.
DEVELOPMENT OF INSULATION TRANSFER-STANDARDS USING A FLAT PLATE CALORIMETER
P. R. Ludtke Mar. 1973 44 p
(NASA Order H-79204-A)
(NASA-CR-140710; NBSIR-73-301) Avail: NTIS HC $3.75 CSCL 14B

This program was initiated to develop insulation transfer standards to be used for evaluating calorimeters at different locations throughout the country. Various types of insulation materials were evaluated for use as transfer-standards. Samples were prepared for preliminary evaluation from selected candidate insulation materials. A 30.5 cm diameter double guarded flat plate calorimeter at MSFC was provided for testing. The calorimeter was checked and the boiloff-gas instrumentation updated. Thermal conductivity screening tests were conducted using liquid nitrogen on open and closed cell foam and fiber glass samples. The mean thermal conductivity values of the samples tested during the screening tests are presented. Compliance with the proposed ASTM standard method of test for heat flux through evacuated insulations was stressed. Author

N75-10404*# National Bureau of Standards, Washington, D.C. Fire Technology Branch.
FIRE DETECTION: THE STATE-OF-THE-ART
Richard L. P. Custer and Richard G. Bright Jun. 1974 120 p refs Sponsored by NASA
(NASA-CR-140653; NBS-TN-839) Avail: NTIS MF $2.25; SOD HC $1.55 as C13.46:839 CSCL 14B

The current state-of-the-art in fire detection technology is reviewed considering the nature of fire signatures, detection modes used, test methods, performance requirements and code requirements for fire detection. Present trends in standards development and recommendations for future work are included. An extensive bibliography is provided. Author

N75-10405*# Scientific Translation Service, Santa Barbara, Calif.
CERTAIN SYSTEMATIC ERRORS ARISING IN THE PHOTOMETRY OF PLANETARY DISCS
V. N. Dudinov Washington NASA Nov. 1974 26 p refs Transl. into ENGLISH from Vestn. Kharkov. Univ., no. 28, Ser. Astron. (Kharkov), no. 3, 1967 p 77-89
(Contract NASw-2483)
(NASA-TT-F-15999) Avail: NTIS HC $3.75 CSCL 14E

Systematic errors arising in photometry of planets are discussed. It is found that these errors are caused by diffraction of the lens mount, blurring of the image by atmospheric turbulence, and photographic irradiation in cases of photographic photometry. Author

N75-10406*# Xerox Electro-Optical Systems, Pasadena, Calif.
SHUTTLE SORTIE ELECTRO-OPTICAL INSTRUMENTS STUDY
Nov. 1974 131 p refs
(Contract NAS1-12710)
(NASA-CR-132457) Avail: NTIS HC $5.75 CSCL 14B

A study to determine the feasibility of adapting existing electro-optical instruments (designed and sucessfully used for ground operations) for use on a shuttle sortie flight and to perform satisfactorily in the space environment is considered. The suitability of these two instruments (a custom made image intensifier camera system and an off-the-shelf secondary electron conduction television camera) to support a barium ion cloud experiment was studied for two different modes of spacelab operation - within the pressurized module and on the pallet. Author

N75-10407*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
TRANSLATORY SHOCK ABSORBERS FOR ATTITUDE SENSORS Patent Application
George L. vonPragenau, Irving T. Morgan, and Clifton A. Kirby, inventors (to NASA) Filed 29 Oct. 1974 15 p
(NASA-Case-MFS-22905-1; US-Patent-Appl-SN-518545) Avail: NTIS HC $3.25 CSCL 14B

A translatory shock absorber is provided for mounting an attitude sensor so as to isolate the sensor from translatory vibrations. The translatory shock absorber includes a hollow block structure formed as one piece to form a parallelogram. The absorber block structure includes a movable top plate for supporting the attitude sensor and a fixed base plate with opposed side plates interposed between the plates. At the junctions of the side plates, and the base and top plates, there are machined-out grooves which act as flexible hinges for attenuating translatory vibrations. A damping material is supported on a pedestal which is carried on the base plate between the side plates. The top of the damping material rests against the bottom surface of the top plate for eliminating the resonant peaks of vibration. NASA

N75-10408*# Hale Observatories, Pasadena, Calif.
MEMORY SYSTEMS FOR SIGNAL GENERATING PHOTO-ELECTRIC IMAGE DETECTORS
Edwin W. Dennison [1974] 8 p refs Sponsored by NASA and NSF
(NASA-CR-140669) Avail: NTIS HC $3.25 CSCL 14B

Digital systems are discussed which have the capacity to handle the large amounts of information contained in a typical image. It was used with a high gain pulse counting television camera tube, with a silicon target image detector and an analog to digital converter between the detector and the memory. M.C.F.

N75-10409*# AiResearch Mfg. Co., Los Angeles, Calif.
ENVIRONMENTAL CONTROL SYSTEM TRANSDUCER DEVELOPMENT STUDY Final Report
M. J. Brudnicki 19 Jul. 1974 223 p
(Contract NAS9-13446)
(NASA-CR-140312; AiResearch-74-10325) Avail: NTIS HC $7.25 CSCL 14B

A development test program of transducers for aerospace projects is described. Stability and performance of existing transducers, and improvements compatible with shuttle ECS requirements are investigated. These requirements incorporate design and development features into the transducers, and include the following: (1) improvement of overall transducer ruggedness

and reliability; (2) common transducers for all ECS fluids that will be unaffected by long quiescent periods in the space environment, that will require no maintenance or refurbishing for at least 100 launches; and (3) appropriate self-check features that simplify checkout and maintenance. Models of three different transducers, a three-way valve for pressure transducers from closed liquid loops, surface-type platinum-wire resistance temperature sensors, and a nuclenics gaging system are evaluated. Tests and development improvements are described. Author

N75-10410*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

OAO 2/WISCONSIN EXPERIMENT PACKAGE (WEP) PHOTOMETER USERS GUIDE

Charles D. Wende Nov. 1974 115 p refs

(NASA-TM-X-72533; NSSDC-74-02) Avail: NTIS HC $5.25 CSCL 14B

The user's guide is intended to enable astronomers to reduce the filter photometry data obtained by the WEP carried on the OAO 2 spacecraft. Only information related to the stellar photometer contained within the experiment package is presented, since the nebular photometer failed after 2-1/2 months of operation, while the stellar photometers provided roughly 49 months worth of data. Author

N75-10411*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.

THE 8-18 GHz RADAR SPECTROMETER

Thomas F. Bush and Fawwaz T. Ulaby Sep. 1973 136 p refs

(Contract NAS9-10261)

(NASA-CR-140317; CRES-TR-177-43) Avail: NTIS HC $5.75 CSCL 14B

The design, construction, testing, and accuracy of an 8-18 GHz radar spectrometer, an FM-CW system which employs a dual antenna system, is described. The antennas, transmitter, and a portion of the receiver are mounted at the top of a 26 meter hydraulic boom which is in turn mounted on a truck for system mobility. HH and VV polarized measurements are possible at incidence angles ranging from 0 deg. to 80 deg. Calibration is accomplished by referencing the measurements against a Luneberg lens of known radar cross section. Author

N75-10412*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

AN IMPROVED STATIC PRESSURE PROBE Patent Application

Shimer Z. Pinckney, inventor (to NASA) Filed 29 Oct. 1974 10 p

(NASA-Case-LAR-11552-1; US-Patent-Appl-SN-518685) Avail: NTIS HC $3.25 CSCL 14B

An improved design for shortened static pressure probes for supersonic velocities, is given. The probe has a smaller length than conventional static probes with the same diameter and requires no compensation for yaw angles of up to 10 deg. NASA

N75-10413*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

STATION COORDINATES FOR GEOS-C ALTIMETER CALIBRATION AND EXPERIMENTATION

J. G. Marsh, B. C. Douglas (Wolf R and D Corp.), and D. M. Walls (Wolf R and D Corp.) Aug. 1974 26 p refs Submitted for publication

(NASA-TM-X-70762; X-921-74-242) Avail: NTIS HC $3.75 CSCL 14B

Station coordinates are given for the C-band radar GEOS-C altimeter calibration sites at Bermuda, Merritt, Grand Turk, and Wallops Islands. The coordinates were estimated in a multi-arc dynamic solution using GEOS-2 C-band radar and laser ranges with a priori information from the GSFC-1973 station coordinate solution. Comparisons with other solutions suggest a relative uncertainty of a few meters in each coordinate. Data reductions show that station coordinates of this quality can introduce a rapidly changing error into the altitude of a satellite whose orbit is determined from calibration area data alone. In contrast, global

N75-10414*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

CARBON MONOXIDE MONITOR Patent Application

Robert J. Naumann, inventor (to NASA) Filed 6 Nov. 1974 13 p

(NASA-Case-MFS-22060-1; US-Patent-Appl-SN-521603) Avail: NTIS HC $3.25 CSCL 14B

A device is provided for automatic, real time monitoring of carbon monoxide and for providing a continuous read out of the concentration of carbon monoxide. The monitoring device includes two Y-cut, temperature sensitive quartz crystals which are encapsulated in a helium filled can. One of the cans containing a quartz crystal is surrounded by a wire mesh which carries a thin layer of hopcalite coating. The hopcalite is used for oxidizing the carbon monoxide and the resulting heat of the reaction is detected by the temperature sensitive crystal. Each crystal is driven by a conventional crystal controlled oscillator circuit with a constant frequency bias of a few hundred Hz. The frequencies of the two oscillator circuits are fed into a conventional mixer circuit which beats the frequencies together and produces a single net frequency which is the difference between the two frequencies. NASA

N75-10415# Research Inst. of National Defence, Stockholm (Sweden).

THE GEOMETRICAL ACCURACY OF ELECTRICAL WIRES AND THE INTERFERENCE EFFECTS ON SMALL MEASURING OBJECTS [ELEKTRISKA TRADGIVARES GEOMETRISKA NOGGRANNHET OCH STOERANDE INVERKAN PA SMA MAETOBJEKT]

Bo Janzon May 1972 23 p refs In SWEDISH

(FOA-2-C-2539-D4) Avail: NTIS HC $3.25

The accuracy of wire in the determination of time when used as a measuring instrument in the measurement of air retardation of fast moving splinters is considered, and whether the effect of the wire on the measured object seriously interferes with the results is analyzed by calculations of overall mechanical and aerodynamic conditions. Results show that the geometrical accuracy of the instrument is satisfactory. The interference effects on the measured object are not so large as to render the measuring method unsuitable for measuring air retardation on small fast moving splinters. Author

N75-10416# Sandia Labs., Albuquerque, N.Mex.

LARGE APERTURE ELECTROOPTIC PHOTOGRAPHIC SHUTTER

G. S. Phipps Apr. 1974 17 p refs

(Contract AT(29-1)-789)

(SLA-74-101) Avail: NTIS HC $3.25

Electrooptic shutters have been fabricated for experimental and special purpose applications. Few have been constructed for general photographic use because of the availability of simpler, more desirable devices. The lack of a two-inch aperture mechanical shutter capable of fast, reliable actuation prompted an investigation of other possibilities. This report describes the theory, construction, and problems associated with the use of a PLZT shutter in an imaging system. Author (NSA)

N75-10417# Sandia Labs., Livermore, Calif.

PHOTO-OPTICAL INSTRUMENTATION OF FLYER PLATE TESTS

D. P. VanDyke and G. J. Rohwein Mar. 1974 34 p refs

(Contract AT(29-1)-789)

(SLL-72-105) Avail: NTIS HC $3.75

Typical applications of the principal types of photo-instrumentation systems to flyer plate test setups are discussed and evaluated. General test guidelines are suggested, and specific lighting techniques and data reduction methods are given. Author (NSA)

N75-10418# Sandia Labs., Albuquerque, N.Mex.

REAL TIME DIGITAL CONTROL OF REMOTE TRACKING INSTRUMENTS

D. F. Anderson and L. W. Maschoff [1974] 22 p refs Sponsored by AEC

(SLA-74-5186) Avail: NTIS HC $3.25

ments. Updates are provided at a rate of 10 per second. Input data are from tracking radars. Within the same real time frame, radar target position is plotted for test controller displays. Radio transmission of data, input/output interface units, data processors, and the central computer facility are described.
Author (NSA)

N75-10419# European Space Operations Center, Darmstadt (West Germany)
COMMENTS ON OBSERVATIONS WITH VERY LONG BASELINE RADIO INTERFEROMETERS FOR POSITION DETERMINATION [BEITRAEGE VON BEOBACHTUNGEN MIT RADIOINTERFEROMETERN LANGER BASIS ZUR POSITIONSBESTIMMUNG]
H. G. Walter 1973 22 p refs In GERMAN Presented at the Meeting of the Space Comm. of the Deut. Ges. fuer Ortung und Navigation, Munich, 18 Dec. 1973
Avail: NTIS HC $3.25

The operation of very long baseline radio interferometry is explained, and possible applications to geodesy, geophysics, and astronomy are discussed. Typical observation parameters of radio interferometry are group delay, group velocity, and phase difference. A variance-covariance analysis was used to investigate the accuracies and degree of discrimination of the various effects in the determination of geodetical, geophysical, and astronomical parameters from radiointerferometric measurements. The practical realization of radiointerferometry is described. ESRO

N75-10420# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Antriebssysteme.
APPLICATION OF MULTISPECTRAL COLOR PHOTOGRAPHY TO FLAME FLOW VISUALIZATION
Gisela Stoffers 10 May 1974 31 p refs In GERMAN; ENGLISH summary
(DLR-MITT-74-23) Avail: NTIS HC $3.75; DFVLR, Porz, West Ger. 16,50 DM

For flames of short duration and low intensity of radiation a spectroscopical flame diagnostics is difficult. In order to find some other means of extracting information about the flame structure from its radiation, the feasibility of using multispectral color photography was successfully evaluated. Since the flame photographs are close-ups, there is a considerable parallax between the single images, when several cameras are used, and additive color viewing is not possible. As, for this reason, each image must be analyzed individually, it is advisable to use color film in all cameras. One can either use color films of different spectral sensitivities or color films of the same type with different color filters. Sharp cutting filters are recommended. Author (ESRO)

N75-10421# Physics Lab. RVO-TNO, The Hague (Netherlands).
A DETECTION SYSTEM WITH TWO PHOTOMULTIPLIER UNITS FOR MEASUREMENT OF PROJECTILE TERMINAL VELOCITY [EEN DETECTIESYSTEEM MET TWEE FOTOCELEENHEDEN VOOR EINDSNELHEIDSMETING VAN PROJECTIELEN]
A. W. M. VanderVoort Jul. 1974 72 p In DUTCH; ENGLISH summary
(PhL-1974-22; TDCK-65199) Avail: NTIS HC $4.25

Two optical detection systems and a processor, part of equipment for the velocity measurements of projectiles at the end of their ballistic trajectory, are described. The light intensity decrease caused by the projectile is transformed into an electrical signal by the photomultiplier, which eliminates all erroneous information. Once the distance between the optical systems and the measured time of flight are known, the velocity can be calculated. The equipment used is specgied. ESRO

N75-10422# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AUTOCORRELATION AND SPECTRAL METHODS OF MEASURING SPEED OF MOTION
S. F. Kozubovsky 9 Jul. 1974 12 p refs Transl. into ENGLISH from Avtomatyka Inst. Kibernetyki (USSR), no. 4, 1965 p 31-36
(AD-783973; FTD-HT-23-2295-74) Avail: NTIS CSCL 14/2

In many fields of technology, there is a necessity of measuring the speed of motion without direct contact with the moving body. This problem is particularly important in those cases where the application of contact methods is impossible; such as the speed of hot rolled steel relative to the rolling mill. The speed of motion of this surface can be measured with great accuracy by means of contactless cross-correlation methods, which consist of determining the phase shift of signals received from the moving surface through two sensors placed at a fixed distance from each other. The report discusses this methodology. GRA

N75-10423# TRW, Inc., Philadelphia, Pa.
PRODUCTION ENGINEERING MEASURE FOR THIN FILM RATIOMETER Quarterly Progress Report, 1 Jan. - 31 Mar. 1974
Harry B. Casey 25 Apr. 1974 38 p
(Contract DAAB05-73-C-2077)
(AD-782236) Avail: NTIS CSCL 14/2

The purpose of this Production Engineering Measure is to develop an optimized production process for the manufacture of Thin Film Ratiometers. This report describes the work completed during the Third Quarterly Reporting Period. During this quarter materials and equipment were brought together, and production activity accomplished on the first set of engineering samples. The engineering samples were delivered along with an associated test report. (Modified author abstract) GRA

N75-10424# Air Force Academy, Colo. Frank J. Seiler Research Lab.
A ROOT LOCUS ANALYSIS OF A SEISMIC ISOLATION CONTROL SYSTEM
Dino A. Lorenzini and Michael W. Wynne May 1974 44 p refs
(AF Proj. 7904)
(AD-783615; SRL-TR-74-0010) Avail: NTIS CSCL 17/7

More advanced inertial guidance systems have established a requirement for ultra-precise components. The requisite components must be tested for precision, accuracy and reliability. In order to properly judge the relative precision of gyroscopes, an extremely quiet facility needs to be established. This report presents a classical, linear systems analysis of the Seismic Isolation Gyro Test Facility of the Frank J. Seiler Research Laboratory. The analysis technique used is the Root Locus technique. The analysis commences with the modeling of the individual system components and their combination into sub-systems for separate loop analysis. The loops are identified by their principal sensor; the tiltmeter loop and the Seismometer loop. Following the independent analysis, these loops are combined using inside-out rationale, where the tiltmeter loop is considered as the inside loop. The combination analysis identifies a set of solutions, as well as a possible optimum solution for the aggregate compensation problem. (Modified author abstract) GRA

N75-10425# Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
A RADAR ALTIMETER FOR SATELLITE APPLICATION
J. L. MacArthur Oct. 1973 38 p refs
(Contract N00017-72-G-4401)
(AD-784373; APL-TG-1226) Avail: NTIS CSCL 14/2

A number of satellite radar altimeter designs have been proposed for the purpose of remotely sensing ocean surface parameters. A precision goal of 10 cm is commonly stated to fulfill the major desires of geodesy and oceanography. An altimeter design approach is discussed that requires only a few watts of peak transmit power, a particular advantage in satellite use. A burst programmed, phase-coded waveform is proposed with an effective compression ratio of 4096, which allows a significant power reduction over previous designs. A design capable of implementation with proven devices is achieved, requiring no new developments. At the same time, flexibility is achieved, and several variations of the basic waveform are discussed with digfering levels of performance, complexity, and power consumption. Author (GRA)

N75-10426# White Sands Missile Range, N.Mex. Instrumentation Directorate.
REAL-TIME CINETHEODOLITE DATA SYSTEM (RTCDS) FOR YUMA PROVING GROUND Final Report
Kenneth B. Bellinger Jun. 1974 120 p refs

(DA Proj. 1U6-65072-D-623)
(AD-781969; STEWS-ID-74-2) Avail: NTIS CSCL 17/8

The report covers the systems analysis, design, procurement, installation, checkout, testing, and operator training of the Real-Time Cinetheodolite Data System (RTCDS) for Yuma Proving Ground (YPG), Yuma, Arizona. Related material is included as appendices. Author (GRA)

N75-10427# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

A METHOD FOR DETERMINING THE ERROR OF A LASER GYROSCOPE WHEN MEASURING THE TURNING ANGLE OF A MOVING BASE

Yu. A. Shcherbakov 17 Jul. 1974 8 p refs Transl. into ENGLISH from Izv. Elektrotekhn. Inst. (Leningrad), no. 119, 1973 p 28-30
(AD-783970; FTD-HT-23-2318-74) Avail: NTIS CSCL 17/7

An equation for a laser gyroscope is presented. A block diagram is included to show the functions of the equation. M.C.F.

N75-10428# Nucleonic Data Systems, Inc., Irvine, Calif.

A NUCLEONIC OIL DEBRIS MONITOR FOR DETECTING METAL IN RECIRCULATING LUBRICATING SYSTEMS Final Report

Randall W. Harman Jun. 1974 90 p refs
(Contract DAAJ02-72-C-0107; DA Proj. 1F2-62203-AH-86)
(AD-784137; USAAMRDL-TR-74-28) Avail: NTIS CSCL 14/2

Metallic debris sensors have been developed for recirculating oil lubrication systems. The in-line monitors apply the principle of X-ray fluorescence. The nucleonic oil debris monitors (ODM's) have been designed and fabricated for use with test cell operations involving aircraft transmissions and gear boxes. ODM's were tested to evaluate their sensitivity, accuracy, and response to lubricant temperature over the range of 100F to 300F. Iron in solution and particles of diameters to 300 micrometers were used for both dynamic and static tests with MIL-L-7808 oil. Both debris mass and rate-of-change outputs are provided. (Modified author abstract) GRA

N75-10429# TRW Systems Group, Redondo Beach, Calif.

AN OPTICAL INSTRUMENT FOR IN-SITU STRESS MEASUREMENT IN ROCKS Final Report, 1 Nov. 1972 - 31 Nov. 1974

May 1974 84 p refs
(Contract F44620-73-C-0015; ARPA Order 2269)
(AD-783301; TRW-AT-SVD-TR-74-6; AFOSR-74-1226TR) Avail: NTIS CSCL 08/7

A laboratory model of a holographic instrument, essentially a logging tool, has been designed and tested for measuring in-situ stress in a 9-inch diameter blind exploratory drill hole. The apparatus can ultimately operate remotely at depths of thousands of feet. It has been tested in a simulated borehole in the laboratory on prestressed samples (granite) which upon stress relief produced displacements on the order of .3 micrometers. Data, in the form of holographic plates are stored, on board, the instrument. Displacement fields are stored in fringe patterns covering the holographically recorded images of the strained surface. The holographic instrument consists of separate core drcl, optics, and laser modules and associated electrical and plumbing connections. The performance of the holographic instrument in a dry and water-flooded simulated borehole was excellent. Good quality holographic interferograms were obtained by double exposure, before and after drilling, in a water-flooded environment, of prestressed slabs of granite under loads in the 130 to 300 bar range. (Modified author abstract) GRA

N75-10430# Army Foreign Science and Technology Center, Charlottesville, Va.

SOME PROBLEMS OF AERIAL PHOTOGRAPHIC SURVEYING EMPLOYING COLOR AND SPECTROZONAL PHOTOGRAPHIC MATERIALS

A. N. Uspenskii 10 Sep. 1973 7 p Transl. into ENGLISH from Geod. Kartografiya (USSR), no. 5, 1958 p 42-45
(AD-784147; FSTC-HT-23-1195-73) Avail: NTIS CSCL 14/5

The author discusses problems of aerial photography. It is indicated that color photography is conducted with aerial cameras intended for black-and-white. Problems of installation, changing cameras in flight, exposures, and the size and angle of the port-holes are mentioned. Difficulties encountered in the development of color film with the use of a spiral developing device are listed and recommendations are made for corrections. The author enumerates faults detected in the technology of aerial photo surveys, such as density, lack of shades, maintenance, storage and development, and makes recommendations for improvements. GRA

N75-10431# TRW Systems Group, Redondo Beach, Calif. Space Vehicles Div.

HOLOGRAPHIC STUDY OF ROCK SPECIMENS UNDER UNIAXIAL AND TRIAXIAL LOADS Final Report, 10 Jul. 1972 - 12 Dec. 1973

J. L. Schmidt, T. J. Ahrens, and J. D. OKeefe 9 Aug. 1974 60 p refs
(Contract DNA001-71-C-0100; ARPA Order 1468)
(AD-784433; DNA-3344F) Avail: NTIS CSCL 08/7

Double-exposure holographic interferometry was used to measure the radial and axial displacement profiles over the surface of cylindrical specimens of rock placed under uniaxial and triaxial loads. The rock specimens tested were Mixed Company Sandstone and Lithographic Limestone. The axial loads used in the tests were in the range of 1000 psi to 1600 psi. The hydrostatic pressure for the triaxial test was 4000 psi. Strain distributions were calculated and comparisons were made between the measured total axial strain on the Mixed Company Sandstone specimens and results obtained using conventional strain gauge techniques. A special test pressure vessel was built with a viewing port to accommodate the use of holographic interferometry to measure the surface response of the sandstone specimen during the triaxial test. Author (GRA)

N75-10432# Naval Postgraduate School, Monterey, Calif.

REAL TIME HOLOGRAPHIC INTERFEROMETRY M.S. Thesis

James Wilford Somers Jun. 1974 41 p refs
(AD-784215) Avail: NTIS CSCL 20/6

The thesis presents an introduction into holographic interferometry with its history and applications. Problems involved with recording, developing, and reconstructing real time holographic interferograms are presented. Reconstruction was accomplished using both a conventional camera and a movie camera. A flexible experimental arrangement was used which was applied to the problem of analyzing heat flow in a square enclosure. This problem was examined and some introductory information is presented. Author (GRA)

N75-10433# Army Foreign Science and Technology Center, Charlottesville, Va.

METHODS OF COHERENT OPTICS AND HOLOGRAPHY APPLIED TO PROBLEMS IN ANTENNA ENGINEERING AND DATA PROCESSING

L. D. Bakhrakh, O. N. Vladimirova, A. P. Kurochkin, G. A. Sobolev, and G. Kh. Fridman 27 Apr. 1974 33 p refs Transl. into ENGLISH from Antenny, Sb. (Moscow), no. 2, 1967 p 33-53
(AD-784337; FSTC-HT-23-1861-73) Avail: NTIS CSCL 09/5

Possible applications of coherent optics and holography to problems in antenna engineering and data processing are examined. Methods of coherent optics can be used in simulating antennas, restoring antenna radiation patterns from Fresnel-zone field measurements, and so on. Holography and matched optical filtration are quite effective in image recognition. GRA

N75-10777 Services Electronics Research Lab., Baldock (England).

INGRARED AND VISIBLE RADIATION DETECTORS FOR IMAGING AND NON-IMAGING APPLICATIONS

B. R. Holeman *In* AGARD Opto-Electronics Sep. 1974 16 p refs (For availability see N75-10774 01-74)

N75-10015 European Space Research Organization, Paris (France).

AN EXPERIMENTAL STUDY OF THE THERMAL DECOMPOSITION OF AN ABLATIVE MATERIAL

Jean Jamet et al *In its* Aerospace Res. (ESRO-TT-90) Sep. 1974 p 68-94 refs Transl. into EN%LISH from La Rech.

Aerospatiale, Bull. Bimestriel No. 1973-4, 1973, p 233-244 (For availability see N75-10011 01-02)

36 LASERS AND MASERS

Includes parametric amplifiers.

N75-10434 British Broadcasting Corp., Kingswood (England). Research Dept.
LASER BEAM DEFLECTION
I. Childs Sep. 1974 19 p refs
(BBC-RD-1974/31) Avail: BBC, Kingswood Warren, Tapworth, Surrey, England

The design of a prototype laser deflection system is described, together with some of the principles behind the deflection method chosen. The measured performance of the system is quoted and methods for improving this performance outlined. A comparison is made between the various methods of laser deflection, and the suitability of these methods to broadcasting applications is considered. Author

N75-10435# Kyoto Univ. (Japan). Dept. of Aeronautical Engineering.
A STUDY OF CO2 GASDYNAMIC LASERS. PART 1: THEORETICAL AND NUMERICAL ANALYSIS
Goro Kamimoto, Hiroyuki Matsui, and Ken T. Len Sep. 1973 45 p refs
(CP-38) Avail: NTIS HC $3.75

Theoretical and experimental studies on the CO2 gasdynamic lasers and on the energy transfer in CO2-N2 mixtures are surveyed. Relaxation equations of the molecular energy transfer of the mixture in a nozzle flow are provided. Numerical computations include estimates of (1) optimum conditions for population inversion of the CO2 gasdynamic laser; (2) viscosity effect on the GDL; and (3) the coefficients of small signal gains. In the intramolecular V-V exchange among CO2 molecules, the three assumed mechanisms affect the translational temperature of the mixture and the vibrational temperature T1 (v)2 only very slightly, but affect T(v)3 strongly. The small signal gain coefficient depends strongly on the relaxation mechanisms and relaxation rates. Author

N75-10436# Systems Science and Software, La Jolla, Calif.
LASER-INTERACTION STUDIES. PART 1: A THEORETICAL INVESTIGATION OF LASER SUPPORTED COMBUSTION WAVES. PART 2: MEASUREMENTS OF THE EFFECT OF PARTICULATE, MATTER ON AIR BREAKDOWN BY 1.06 MICRON Final Report
A. A. Boni, H. D. Cohen, D. A. Meskan, and F. Y. Su Aug. 1974 172 p refs
(Contract DAAH01-74-C-0386)
(AD-784356; SSS-R-74-2344) Avail: NTIS CSCL 20/9

Two separate non-linear effects which influence pulsed laser propagation and target interaction have been studied, e.g., laser supported combustion wave (LSC) propagation and laser-induced gas breakdown. A theoretical model describing LSC propagation and which includes the non-linear contributions of the plasma transport and thermodynamic coefficients throughout the wave profile has been developed. The model is one-dimensional and the system of equations is solved by use of the method of quasilinearization. The model uses the deflagration approximation which implies that pressure balance with the atmosphere exists. Numerical results of our calculations are in good quantitative agreement with available experimental data. Experiments also have been performed to determine the effect of particulate matter on laser-induced air breakdown for Nd laser wavelengths (1.06 micrometer) and for pulse widths of 30 nsec. The breakdown thresholds for air in the presence of SiO2 and carbon fibers of 9 micrometer, 6.6 micrometer and 68 micrometer diameters were measured. (Modified author abstract) GRA

N75-10437# Bendix Corp., Kansas City, Mo.
REMOVAL OF INSULATION FROM MULTICONDUCTOR WIRE TAPE USING A CARBON DIOXIDE LASER
R. T. Horn May 1974 26 p refs Revised
(Contract AT(29-1)-613)
(BDX-613-887-Rev) Avail: NTIS HC $3.75

Use of a carbon dioxide laser for removing insulation from multiconductor wire tape was investigated. A process to remove insulation from single wires was developed. Microscopic examination and emission spectrographs were used to evaluate process results. Author (NSA)

N75-10438# Bendix Corp., Kansas City, Mo.
INSULATION REMOVAL FROM WOVEN-WIRE TAPE
R. L. Naney May 1974 22 p refs Revised
(Contract AT(29-1)-613)
(BDX-613-1067-Rev) Avail: NTIS HC $3.25

The best method was determined for stripping a two-layer polyester insulation from selected areas of a 90-strand AWG-33 multiconductor woven-wire tape. Only two of several methods evaluated were capable of stripping the insulation completely without degrading the copper. Both chemical stripping and laser stripping produced acceptable results; however, laser stripping is faster and eliminates the tedious task of removing the residue of the chemical stripping process. Reduced wire damage and lower processing cost also are potential advantages. Author (NSA)

N75-10439# Los Alamos Scientific Lab., N.Mex.
SOFT APERTURES FOR REDUCING DAMAGE IN HIGH POWER LASER AMPLIFIER SYSTEMS
A. J. Campillo, B. Carpenter, B. E. Newman, and S. L. Shapiro Jan. 1974 3 p refs
(Contract W-7405-eng-36)
(LA-5496-MS) Avail: NTIS HC $3.25

Soft apertures have been constructed for tailoring the spatial profile of a light beam to minimize harmful diffraction effects that lead to self-focusing and consequent damage while still enabling substantial energy extraction from amplifiers. Author (NSA)

N75-10440# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Porz (West Germany)j Inst. fuer Angewandte Gasdynamik.
LASER IN AERODYNAMIC TESTING: LOCAL MEASURING METHODS
Gustav Schweiger 28 Jan. 1974 67 p refs Presented at the 1st Joint CTA - DFVLER Workshop, Sao Jose dos Campos, Brazil, 1-12 Oct. 1973
(DLR-MITT-74-09) Avail: NTIS HC $4.25; DFVLR, Porz, West Ger. 25,10 DM

Fundamentals of light scattering on gases and small particles are given. Application of light scattering experiments for local measurements in gasdynamics are discussed. Velocity measurements (Doppler technique, two spot method) gas density measurements (Rayleigh- and Raman scattering) and local temperature measurements (Raman scattering) are treated. Examples of resonance scattering are given. Author (ESRO)

N75-10441# Institut Franco-Allemand de Recherches, St. Louis (France).
A METHOD FOR IDENTIFYING LARGE PARTICLES IN LASER ANEMOMETRY [EIN VERFAHREN ZUR ERKENNUNG GROSSER TEILCHEN IN DER LASERANEMOMETRIE]
H. J. Pfeifer 2 Nov. 1973 15 p refs In GERMAN
(ISL-37/73) Avail: NTIS HC $3.25

A method based on Mie scattering is described which allows elimination of signals coming from particles with a diameter of more than 0.2 micrometer. If a particle is illuminated by unpolarized light, the scattered radiation is either linearly or elliptically polarized. The total intensity of scattered light can then be determined in addition to the direction and degree of polarization. These three magnitudes depend on, among other things, the particle radius and refraction index. The principle of the method described for eliminating large particles is based on the intensity ratio of polarized scattered radiation in observation direction to the radiation perpendicular to this plane. The measurement set-up is described and some results are presented. ESRO

N75-10442# Radio Corp. of America, Lancaster, Pa.
GaAs LARGE OPTICAL CAVITY (LOC) LASER DIODE FOR

COMMUNICATIONS RECEIVERS Final Technical Report, 16 Nov. 1972 - 20 Mar. 1974
James T. OBrien Jul. 1974 75 p refs
(Contract DAAB07-73-C-0062)
(AD-784341; ECOM-0062-3) Avail: NTIS CSCL 09/5

Work has been completed on the development of a LOC double heterojunction laser diode for use as the transmitting component for an optical communicator. A thermal analysis of the LOC diode, mounted in the microwave package, is presented along with measurements of the total device inductance. A new epitaxial system was constructed which incorporates an all-electronic temperature control and programming system. Results of both four and five layer epitaxial junctions are discussed. Pulse driver developments and performance characteristics of the laser devices are given at duty cycles in excess of 5% at pulse repetition frequencies up to 5.0 MHz. A two position life test rack was constructed for the purpose of operating the LOC laser diodes at currents up to 15 amperes and pulse repetition rate of 5.0 MHz at 10 nanosecond pulse width. Some preliminary life test data is presented along with recommendations for extending the performance of the device. Author (GRA)

N75-10443# General Electric Co., Philadelphia, Pa. Space Div.
CO2 MHD LASER: ANALYSIS, DESIGN AND SHOCK TUNNEL EXPERIMENTS Technical Information Series
B. Zauderer, E. Tate, and C. H. Marston May 1974 8 p refs
Sponsored in part by ARPA
(Contract N00014-73-C-0243)
(AD-782226; Doc-74SD221; ONR-TR-19) Avail: NTIS CSCL 20/5

MHD (magnetohydrodynamic) laser gain exceeding 0.2%/cm has been achieved in the GE/ONR shock tunnel using a mixture of 78% Helium, 18% Argon and 4% CO2 with either 1% Xe or 0.1% Cs added to the basic mixture for seeding. Long relaxation times and non-emitting electrodes required use of some external voltage augmentation to achieve the necessary plasma conditions in the available generator length. The MHD laser analysis, design of a channel based on that analysis, and experimental results to date are discussed. (Modified author abstract) GRA

N75-10444# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
ANALYTICAL AND EXPERIMENTAL RESEARCH ON HF CHEMICAL LASERS Annual Report, 26 Sep. 1973 - 30 Jun. 1974
J. G. Skifstad 14 Jun. 1974 10 p refs
(Contract DAAH01-73-C-0167; DA Proj. 1T6-62609-A-308)
(AD-784590; RK-CR-74-12) Avail: NTIS CSCL 20/5

The report summarizes the research activity on HF lasers. Analytical results for rotational relaxation indicated significant compromises in the performance of line selected oscillators or amplifier (MOPA) configurations with HF as contrasted with Boltzmann populations of the rotational levels. An experimental program was initiated to obtain measurements in HF/DF flow systems pertinent to chemical laser devices. The initial efforts have been concerned with development of an electrically excited HF laser for c.w. optical studies and the design of a low density flow facility for the research. (Modified author abstract) GRA

N75-10445# Texas Instruments, Inc., Dallas. Central Research Labs.
ND-DOPED MIXED CRYSTAL LASER MATERIAL RESEARCH Final Report, 1 Jul. 1972 - 31 Mar. 1974
W. C. Holton, D. W. Bellavance, F. J. Bruni, M. DeWit, and R. K. Watts Jul. 1974 105 p refs
(Contract F33615-72-C-1977)
(AD-783842; AFML-TR-74-126) Avail: NTIS CSCL 20/5

The mixed crystal system Y3(Al(x)Ga(1-x)5O12 was investigated at a laser host material for Nd(3+). Spectroscopic studies established that at the optimum composition a reduction by a factor of 3 in gain, as compared with YAIG (Y3Al5O12), is possible, and implying increased output energy in Q-switched operation. Mechanical and thermal properties were found to be similar to those of YAIG. Laser rods were fabricated from boules of the material, examined for optical quality, and tested under Q-switched conditions. It is concluded that although the mixed crystal material has potential advantages, it is not possible to realize this potential because of the difficulty of growing crystals of high optical quality. (Modified author abstract) GRA

N75-10446# TRW Systems Group, Redondo Beach, Calif.
H2-Cl2 CHEMICAL LASER PROGRAM. PART 3: ADDITIONAL ARC JET LASER EXPERIMENTS Final Report, Feb. - Jun. 1974
G. Emanuel, J. Trost, R. A. Ackerman, and R. J. Reiner Jun. 1974 66 p
(Contract DAAH01-73-C-0446)
(AD-782871; RK-CR-74-9-Pt-3) Avail: NTIS CSCL 20/5

The report describes work done under a program to demonstrate feasibility of a supersonic mixing laser using chain reactions of the H2-Cl2 system to produce vibrationally excited HCl. The report describes both DF and HCl laser experiments to determine the cause of low HCl power formerly observed. A factor of 50 improvement in power was obtained with a peak of 0.93 watts cw. Chain lasing occurred at a cavity pressure as high as 25 torr on transitions P2(7) through P2(10). Further improvement in the power is limited by collisional deactivation, primarily that due to Cl atoms. (Modified author abstract) GRA

N75-10447# United Aircraft Corp., East Hartford, Conn. Research Labs.
E-BEAM HCl LASER Final Report
John A. Shirley, R. J. Hall, and Barry R. Bronfin 30 Aug. 1974 58 p refs
(Contract N00014-72-C-0450)
(AD-784500; UARL-N911340-13) Avail: NTIS CSCL 20/5

The feasibility of producing stimulated emission in the 3 to 5 micrometer wavelength band by direct electron impact excitation of hydrogen chloride vibrational levels is being investigated theoretically and experimentally. Theoretical analysis predicts an optical gain coefficient in excess of 0.4%/cm. The importance of high electron density and low initial gas temperature is predicted. The results of electric discharge/laser experiments are described. Experiments have been conducted in 5% HCl/95% Argon mixtures at p = 10 torr in the e-beam sustained discharge. These conditions were insufficient to demonstrate stimulated emission. (Modified author abstract) GRA

N75-10448# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
ANALYTICAL INVESTIGATION OF THE EFFECTS OF ROTATIONAL RELAXATION IN A C. W., HF CHEMICAL LASER Interim Technical Report
C. M. Chao and J. G. Skifstad 14 Jun. 1974 37 p refs
(Contract DAAH01-73-C-0167; DA Proj. 1T6-62609-A-308)
(AD-784589; RK-CR-74-11) Avail: NTIS CSCL 07/4

Rotational relaxation effects in a c. w. chemical laser amplifier or a line-selected oscillator are examined in terms of a simple analytical model. Three rotational levels in each vibrational level of the lasing transition are taken to have finite rotational relaxation rates. The results indicate the effects are likely to be significant, lowering the available power and leading to an optimum level of the line intensity for maximum power output, apart from consideration of optical losses at mirrors, windows, etc. While the model accounts for Delta j = plus or minus 1 transitions only, the collisional transition probability was augumented in the computations in an attempt to provide high estimates for the rotational relaxation rates, including factors such as Delta j = 1 transitions. Author (GRA)

N75-10449# Lockheed Missiles and Space Co., Huntsville, Ala. Research and Engineering Center.
ANALYSIS OF CHEMICAL LASERS. VOLUME 1: LASER AND MIXING PROGRAM LAMP THEORY AND USER'S GUIDE Final Report, 20 Sep. 1973 - 30 Jun. 1974
Juergen Theones, A. J. McDanal, Alan W. Ratliff, and Heldon D. Smith Jun. 1974 156 p refs Supercedes RK-CR-73-2 5 Vol.
(Contract DAAH01-74-C-0173; DA Proj. 1T6-62703-43)
(AD-784531; LMSC-HREC-TR-D390222-1;
RK-CR-74-13-Vol-1; RK-CR-73-2) Avail: NTIS CSCL 20/5

A Laser and Mixing Program (LAMP) is described which considers the coupling between gasdynamic properties, cavity characteristics, and resulting laser radiation for diffusion-type chemical laser oscillator cavities. The formulation assumes parallel

mixing and constant lateral pressure with lasing due to single or multiple transitions between certain vibrational/rotational molecular energy levels. Excitation of the active medium traversing a Fabry-Perot optical cavity is caused by highly exothermic reactions between gradually mixing reactants discharged from a grid nozzle. Uniform, premixed inviscid laser cavity flows can be investigated as a special case of the more general analysis. This report contains a description of the analysis as well as a user's manual. Author (GRA)

N75-10450# Lockheed Missiles and Space Co., Huntsville, Ala. Research and Engineering Center.
ANALYSIS OF CHEMICAL LASERS. VOLUME 2: CHEMICAL LASER FLOW ANALYSES Final Report, 20 Sep. 1973 - 30 Jun. 1974
Ronald R. Mikatarian, Shelby C. Kurzius, A. J. McDanal, and Juergen Theones Jun. 1974 131 p refs 5 Vol.
(Contract DAAH01-74-C-0173; DA Proj. 1T5-62609-A-308)
(AD-784532; LMSC-HREC-TR-D390222-2; RK-CR-74-13-Vol-2) Avail: NTIS CSCL 20/5

The results of a study undertaken to compare theoretical calculations with experimental laser-type reactive flow data are discussed. The results of the study are most encouraging. The strong influence of nozzle boundary layers upon laser cavity properties is demonstrated as is the applicability of a two-equation (kW) turbulence model for describing the turbulent transport in laser cavity flows. The potential effects of finite rate turbulent eddy dissipation are discussed. An analytical investigation has been initiated on a TCL device designed by Rocketdyne in which CO2 is injected into the preburner nozzle boundary layer. Interim results are presented showing the development of the nozzle boundary layer profiles. Results of a parametric study of a D2-F2 direct combustion laser device are presented. (Modified author abstract) GRA

N75-10451# Lockheed Missiles and Space Co., Huntsville, Ala. Research and Engineering Center.
ANALYSIS OF CHEMICAL LASERS. VOLUME 3: ONE DIMENSIONAL LASER AND MIXING PROGRAM GUIDE Final Report, 20 Sep. 1973 - 30 Jun. 1974
Larry R. Ring and Ronald R. Mikatarian Jun. 1974 78 p refs 5 Vol.
(Contract DAAH01-74-C-0173; DA Proj. 1T5-62609-A-308)
(AD-784533; LMSC-HREC-TR-D390222-3; RK-CR-74-13-Vol-3) Avail: NTIS CSCL 20/5

The One-Dimensional Laser and Mixing Program (ODLAMP) is described for analyzing multi-species lasing in a chemically reacting one-dimensional stream with mass addition. Mass is assumed to be injected (at a predescribed rate) from each of two separate streams, into a primary lasing stream. Lasing due to P-transitions (i.e., transitions proceeding from (v-1,J-1) to (v,J)) is treated. Both the analysis and computer programs are presented, including an input guide, sample calculation and flow chart. Author (GRA)

N75-10452# Lockheed Missiles and Space Co., Huntsville, Ala. Research and Engineering Center.
ANALYSIS OF CHEMICAL LASERS. VOLUME 4: METHOD OF CHARACTERISTICS LASER AND MIXING PROGRAM (MOC-LAMP) THEORY ANP USER'S GUIDE Final Report, 20 Sep. 1973 - 30 Jun. 1974
Alan W. Ratliff, Juergen Theones, and Sheldon D. Smith Jun. 1974 93 p refs 5 Vol.
(Contract DAAH01-74-C-0173; DA Proj. 1T5-62609-A-308)
(AD-784534; LMSC-HREC-TR-D390222-4; RK-CR-74-13-Vol-4) Avail: NTIS CSCL 20/5

A laser and mixing computer program is described which considers the coupling between gasdynamic properties, cavity characteristics, and resulting laser radiation for diffusion-type chemical laser oscillator cavities. The formulation assumes non-uniform mixing with lateral pressure gradients and lasing due to multiple transitions between the various excited levels of the lasing molecule. Excitation of the active medium traversing a Fabry-Perot optical cavity is caused by highly exothermic reactions between gradually mixing reactants discharged from a grid nozzle. Uniform, premixed inviscid laser cavity flows can be investigated as a special case of the more general analysis. Author (GRA)

N75-10453# Alabama Univ., Huntsville. Dept. of Physics.
LOW LOSS WINDOW MATERIALS FOR CHEMICAL LASERS Semiannual Technical Report, 9 Jan. - 9 Jul. 1974
James A. Harrington Jul. 1974 28 p refs
(Contract DAAH01-74-C-0437; ARPA Order 2614)
(AD-784326; UAH-RR-154) Avail: NTIS CSCL 20/5

The main objective of this research program is to study the optical properties of materials suitable for use as low loss chemical laser windows. In order to investigate various candidate materials, measurements will be made of the optical absorption coefficient at DF (3.8 microns) and HF (2.7 microns) frequencies using chemical laser calorimetry. In conjunction with the absorption measurements, chemical polishing techniques will be developed and applied to some materials to minimize surface absorption. Successful polishes were developed for CaF2 and BaF2 but no successful polish was found for SrF2. Application of the polishes should not only help reduce surface absorption but also minimize laser induced surface damage from high powered lasers. Chemical laser calorimetry was successfully carried out at HF frequencies on two Polytran alkaline earth fluoride samples. The results for the absorption coefficient are compared to those obtained from spectral emittance and CO laser calorimetry measurements. The higher values of the absorption coefficient obtained by HF laser calorimetry as compared to the values obtained by the other two methods are believed to be due to absorption by water bands on the surface or to OH ions in the crystals. (Modified author abstract) GRA

N75-10454# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
LASERS IN CHEMISTRY
N. G. Basov, E. P. Markin, A. N. Graevskii, and A. V. Pancratov 25 Jun. 1974 27 p refs Transl. into ENGLISH from Priroda (USSR), no. 5, 1973 p 18-26
(AD-783049; FTD-MT-24-859-74) Avail: NTIS CSCL 07/5

The use of infrared lasers to influence chemical reactions is discussed. The wavelength requirements of an infrared laser to control chemical processes are examined. The effects of laser radiation on the molecular energy levels of the chemical reaction are explained. Diagrams of the reaction of tetrafluorinehydrazine are provided. Author

N75-10776 Royal Radar Establishment, Malvern (England).
LASER SOURCES
P. A. Forrester *In* AGARD Opto-Electronics Sep. 1974 9 p refs (For availability see N75-10774 01-74)

N75-10782 Service Technique des Telecommunications de l'Air, Paris (France).
PRINCIPLE AND REALIZATION OF AERONAUTICAL LASER SYSTEMS [PRINCIPE ET REALISATION DES SYSTEMES LASER EN AERONAUTIQUE]
Patrice Mollie and Francois Chabannes (Lab. Central de l'Armement) *In* AGARD Opto-Electronics Sep. 1974 21 p refs In FRENCH; ENGLISH summary (For availability see N75-10774 01-74)

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N75-10455*# Sun Oil Co., Marcus Hook, Pa. Applied Research Div.
STUDY TO DEFINE BEHAVIOR OF LIQUID LUBRICANTS IN AN ELASTOHYDRODYNAMIC CONTACT
James L. Lauer 17 Oct. 1974 97 p refs
(Contract NAS3-17593)
(NASA-CR-134671) Avail: NTIS HC $4.75 CSCL 11H

The spectra of an ester and a saturated hydrocarbon polymer were obtained at pressures ranging from ambient to 2 GN/sq m (20 kilobar) and at temperatures between ambient and 180 C in absorption and between 150 C and 210 C in emission. To simulate contact conditions the fluids were contained in the tiny sample volume of a diamond cell, i.e., the hole in a metal spacer separating two diamonds pressed against each other in a nut

crackerlike arrangement. Pressures could be deduced from bandshifts and states of aggregation from bandwidths in the fluorescence spectrum of a ruby crystal immersed in the fluids. An infrared Fourier transform spectrometer was used with attachments specially designed to analyze the radiation passed through the sample and both diamonds (absorption technique) or the radiation emanating from the heated sample and passing through only one diamond (emission technique). The latter technique is applicable to operating EHD contacts. Spectral changes pointing to possible glass transitions and composition changes were observed. Emission and absorption spectra were generally equivalent. Some emission bandshapes appear to be temperature sensitive enough to be useful as internal temperature probes. Author

N75-10456*# National Aeronautics and Space Administration. Pasadena Office, Calif.
ZERO TORQUE GEAR HEAD WRENCH Patent Application
Allan R. McDougal, inventors (to NASA) (JPL) and Robert M. Norman (JPL) Filed 10 Oct. 1974 18 p
(Contract NAS7-100)
(NASA-Case-NPO-13059-1; NASA-Case-NPO-13436-1; US-Patent-Appl-SN-513690) Avail: NTIS HC $3.25 CSCL 13I

A gear head wrench, particularly suited for use in applying torque to bolts without transferring torsional stresses to bolt-receiving structures, is presented. The wrench is characterized by a coupling including a socket, for connecting a bolt head with a torque multiplying gear-train, the gear-train is present in a housing with an annulus concentrically related to the socket and adapted to be coupled with a spacer interposed between the bolt head and the juxtaposed surface of the bolt-receiving structure. The bolt-receiving structure applies a balancing counter-torque to the spacer as torque is applied to the bolt head whereby the bolt-receiving structure is substantially isolated from torsional stress. As a result of the foregoing, the operator of the wrench is substantially isolated from any forces which may be imposed. NASA

N75-10457*# Stanford Univ., Calif. Dept. of Mechanical Engineering.
INTEGRATED PNEUMATIC TRANSPORTER-INCINERATOR-AFTERBURNER SUBSYSTEM DEVELOPMENT Final Report
John R. Manning Oct. 1974 26 p refs
(Grant NGR-05-020-706)
(NASA-CR-140686) Avail: NTIS HC $3.75 CSCL 13I

The design and fabrication of a prototype automatic transport system to move wastes to an incinerator onboard a spacecraft are described. The commode and debris collector, subsystems to treat noncondensible gases, oxygen supply to incinerator and afterburner, and removal and ash collection from the incinerator are considered, as well as a zero gravity condenser. In-depth performance testing of a totally integrated incineration system and autoclaving as a waste treatment method are included. J.A.M.

N75-10458*# Atomics International, Canoga Park, Calif.
PRELIMINARY DESIGN OF A PRIMARY LOOP PUMP ASSEMBLY (PLPA), USING ELECTROMAGNETIC PUMPS Final Report
T. A. Moss, G. Matlin, L. Donelan, J. L. Johnson, and I. Rowe Sep. 1972 126 p refs
(Contract NAS3-15342)
(NASA-CR-140713; AI-72-54) Avail: NTIS HC $5.75 CSCL 13K

A preliminary design study of flight-type dc conduction-permanent magnetic, ac helical induction, and ac linear induction pumps for circulating 883 K (1130 F) NaK at 9.1 kg/sec (20 lb/sec) is described. Various electromagnetic pump geometrics are evaluated against hydraulic performance, and the effects of multiple windings and numbers of pumps per assembly on overall reliability were determined. The methods used in the electrical-hydraulic, stress, and thermal analysis are discussed, and the high temperature electrical materials selected for the application are listed. Author

N75-10459*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AN IMPROVED PORTABLE PEENING GUN Patent Application
Vincent P. Caruso and Elbert J. Minter, inventors (to NASA) Feed 6 Nov. 1974 14 p
(NASA-Case-MFS-23047-1; US-Patent-Appl-SN-521602) Avail: NTIS HC $3.25 CSCL 13I

An improved portable peening gun is described which is characterized by a pneumatic motor, an axially reciprocable hammer to be driven by the motor from an initial position along a linear path, and an improved peening head which includes an axially reciprocable rod bundle coaxially aligned with the hammer and disposed within the path. The improved head includes a plurality of peening rods, each being characterized by an anvil defined at one end for receiving the hammer upon impacting engagement, and a peening surface defined at the other end which conforms to a segment of a sphere having a radius substantially equal to one-half the thickness of the rod. A barrel for supporting the rod bundle for axial reciprocation is included, along with a helical spring disposed within the barrel for urging the bundle in displacement toward its initial position. NASA

N75-10460# Bendix Corp., Kansas City, Mo.
ULTRASONIC WELDING OF ELECTRICAL TERMINATIONS
D. E. Stittsworth Dec. 1973 26 p
(Contract AT(29-1)-613)
(BDX-613-1016) Avail: NTIS HC $3.75

Ultrasonic welding of electrical terminations is being investigated. Activity includes equipment evaluation and modification, weld tip design, and weld schedule certification on four different material combinations. The ultrasonic welding process has not been fully evaluated, but a potential for future production program applications is indicated. Aluminum and copper in varying thicknesses and combinations were tested. Author (NSA)

N75-10461# National Centre of Tribology, Risley (England). European Space Tribology Lab.
THERMAL VACUUM QUALIFICATION TEST OF NO. 1 HAWKER SIDDELEY DYNAMICS LOW SPEED MECHANISM
J. Gillies and A. J. Walton Jan. 1974 68 p Sponsored by ESRO
(ESRO-ESTL-3; ESRO-CR(P)-507) Avail: NTIS HC $4.25

A solar paddle drive mechanism was submitted to thermal vacuum qualification tests. This involved four separate tests, each of 8 hours duration, with the mechanism operating at normal speed (1 rev/day) while being subjected to temperatures marginally more extreme than those anticipated in satellite operation. Measurements were made of the angular error, (the difference between clock demand and actual shaft position), drive motor power, temperatures throughout the mechanism and power slip ring noise levels. After some initial difficulties with encoder digital signals during the tests at higher temperatures, the mechanism was shown to operate within its specification during all the tests. Results of all the measurements are summarized. Author (ESRO)

N75-10462# National Centre of Tribology, Risley (England). European Space Tribology Lab.
[ACTIVITIES OF THE EUROPEAN SPACE TRIBOLOGY LABORATORY] Annual Report, 1973
1974 15 p refs Sponsored by ESRO
(ESRO-ESTL-5; ESRO-CR(P)-509) Avail: NTIS HC $3.25

The European Space Tribology Laboratory was established in March 1972 by the United Kingdom Atomic Energy Authority under contract to ESRO. The objectives of the Laboratory are 20 test satellite mechanisms under vacuum and at temperatures equivalent to those in space, to undertake a development program to obtain tribological data required for future mechanism designs, and to become a center of expertise in this field so that it can provide a consulting service to the European aerospace consortia. A summary of tests on solar paddle drive mechanisms is presented. Research and development activities to provide information of direct relevance to mechanism design are described. They mainly concern bearing and lubrication. ESRO

N75-10463# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HIGH-TEMPERATURE COATINGS ON GRAPHITE
V. S. Dergunova, A. V. Emyashev, G. A. Kravetskii, and V. N. Sushin 27 Jun. 1974 15 p refs Transl. into ENGLISH from the monograph "Trudy v Vsesoyuznogo Soveshchaniya po Zharostoikim Pokrytiyam" USSR, 1972 p 112-120
(AD-783567; FTD-HT-23-1302-74) Avail: NTIS CSCL 11/3

This work studies the deposition of protective coatings on graphite substrates, designated for parts which operate under various conditions. Depending on the requirements imposed on a particular product, the authors study protective coatings which were obtained by precipitation from a vapor-gas phase, surfacing, plasma deposition. Some coatings described are ZrO_2, Al-Al_2O_3, B-Si, Al_2O_3-Si, Al_2O_3-Mo, and oxide mixtures. GRA

N75-10464# Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
OPTIMIZATION OF WATERJET PROPULSION SYSTEMS FOR SURFACE EFFECT SHIPS
A. Douglas Carmichael and William R. Johanek May 1974 70 p refs
(Contract N00014-67-A-0204-0052)
(AD-781916; OE-74-10) Avail: NTIS CSCL 13/10

Water-jet propulsion systems using flush inlets suitable for use on surface effect ships are studied. Equations are developed and incorporated into a computer program which optimizes the system on a least total weight basis. Resistance, displacement, range, speed and other data are used to calculate total propulsion system weight for a number of jet velocity ratios. The system utilizes marine gas turbine engines coupled to multi-stage axial-flow pumps. Variable area flush inlets and constant area nozzles are used. Results for a 2000 ton vessel are presented.
GRA

N75-10465# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
COATINGS FOR PROTECTING METALS UNDER HIGH-TEMPERATURE HEATING AND DEFORMATION
S. S. Solntsev, V. A. Rozenenkova, G. V. Barytsnikova, and A. T. Tumanov 1 Jul. 1974 19 p refs Transl. into ENGLISH from the monograph "Trudy v Vsesoyuznogo Soveshchaniya po Zharostoikim Pokrytiyam" USSR, 1972 p 213-223
(AD-783566; FTD-HT-23-1306-74) Avail: NTIS CSCL 11/3

The development and characteristics of protective coatings applied to metal surfaces prior to metal working processes are discussed. The preparation and application of the temporary protective coatings are described. The main requirements for the protective coatings are tabulated. The changes in the mechanical properties of selected metals resulting from the use of protective coatings are reported. Author

N75-10466# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PROTECTIVE COATINGS FROM REFRACTORY COMPOUNDS ON METALS AND GRAPHITE
G. V. Samsomov, A. L. Burykina, and A. P. Epik 17 Jul. 1974 46 p Transl. into ENGLISH from Zashch. Pokrytiya na Metallakh (USSR), no 6, 1972 p 5-24
(AD-783923; FTD-MT-24-1341-74) Avail: NTIS CSCL 11/3

There are different methods for the deposition of protective coatings made from refractory compounds on metals and nonmetallic materials. Coatings are applied from the liquid, solid or vapor phases; combined methods of deposition are used. The selection of a method is determined by the nature of the coating material and substrate, by the purpose for which the coating is designed and by the conditions of its operation. The Laboratory of Coatings of the Institute of Problems of the Study of Materials AS USSR in the course of the last ten years ' as been developing the technology. Boride, carbide, nitride and silicide diffusion coatings are described. Plasma and detonation methods are also discussed. GRA

N75-10467# Catholic Univ. of America, Washington, D.C. Inst. of Ocean Science and Engineering.
PARAMETERS GOVERNING THE EROSION RESISTANCE OF COATING SUBSTRATE SYSTEMS
F. Envent and A. Thiruvengadam Jul. 1974 68 p refs
(Contract N00014-67-A-0377-0008)
(AD-784496; Rept-74-1) Avail: NTIS CSCL 11/3

An analysis of coating systems is developed to explain the different failure modes caused by erosion including cavitation, rain and solid impact. The analytical results are compared with other published data. Design charts are included for practical use in selecting erosion resistant coating systems.
Author (GRA)

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N75-10468*# International Business Machines Corp., Huntsville, Ala. Electronics Systems Center.
INVESTIGATION OF TANTALUM WET SLUG CAPACITOR FAILURES IN THE APOLLO TELESCOPE MOUNT CHARGER BATTERY REGULATOR MODULES
J. F. Williams and D. H. Wiedeman 31 Jan. 1973 112 p
(Contract NAS8-20899)
(NASA-CR-120497; IBM-73W-00050) Avail: NTIS HC $5.25 CSCL 09A

This investigation describes the capacitor failures and to identify the cause of the failure mechanism. Early failures were thought to have happened because of age and/or abuse since the failed capacitors were dated 1967. It is shown that all 1967 capacitors were replaced with 1972 capacitors. M.C.F.

N75-10469# Sandia Corp., Albuquerque, N.Mex.
MODERN TRENDS IN ENVIRONMENTAL TESTING
A. J. Clark, Jr. 1 Feb. 1974 16 p refs Presented at the 20th Ann. Tech. Meeting and Equipment Exposition of the Inst. of Environ. Sci., Washington, D. C., 28 Apr. 1974 Sponsored by AEC
(SLA-73-5931; Conf-740415-1) Avail: NTIS HC $3.25

From 20th annual technical meeting and equipment exposition of the Institute of Environmental Sciences; Washington, District of Columbia, U.S.A. (28 Apr. 1974). NSA

N75-10470# Sandia Corp., Albuquerque, N.Mex.
TECHNIQUE FOR TESTING THE TENSILE STRENGTH OF THERMOCOMPRESSION BONDS
G. A. Carlson Mar. 1974 20 p refs
(Contract AT(29-1)-789)
(SLA-74-93) Avail: NTIS HC $3.25

A technique is described for testing the tensile strength of thermocompression bonds using stress waves generated by pulsed electron beam deposition. The technique has been used to test the strength of bonds prepared using different bonding parameters. Tensile strengths of 1 to 5 kbar are indicated for the bonds tested. Author (NSA)

N75-10471# Sandia Corp., Albuquerque, N.Mex.
ACCELERATED LIFETESTING OF THIN FILM TUNGSTEN CONTACTS FOR A MILLIWATT Si-Ge THERMOPILE
J. N. Sweet Apr. 1974 45 p refs
(Contract AT(29-1)-789)
(SLA-73-1087) Avail: NTIS HC $3.75

Accelerated lifetests have been performed to determine the dependence of contact lifetime on temperature for thin film W contacts sputter deposited onto one dimensional Si-Ge thermopiles used in a radioisotopic thermoelectric generator. The results of these tests indicate that the temperature dependence of contact lifetime follows an Arrhenius relationship. Extrapolation of the data from the 550-725 C experimental temperature region to lower temperatures indicates that ten year operation without contact degradation is possible at temperatures below 460 C. An examination of the precision of the estimated regression indicates that the ten year temperature limit is 450 C at the 99.9% confidence level. Contact failure, as determined from contact resistance measurements, is accompanied by loss of adhesion and unbonding at the W/Si-Ge interface.
Author (NSA)

N75-10472# Forsvarets Teletekniska Lab., Stockholm (Sweden).
PRESENT-DAY STATUS OF ACCELERATED TESTING OF TRIMMING POTENTIOMETERS
T. G. Charles and E. Stenberg Paris ESRO Jan. 1974 22 p refs
(Contract ESTEC-609/68)
(ESRO-CR-167) Avac: NTIS HC $3.25

The accelerated life testing of several types of trimming potentiometers is reported based on a survey of the literature. The majority of failures in the instrument are attributed to mechanical faults, and it is recommended that, where temperature coefficient ranges permit, cermet trimmers be used, and that fixed resistors not be used because of their higher failure rate.
Author (ESRO)

N75-10473# Forsvarets Teletekniska Lab., Stockholm (Sweden).
PRESENT-DAY STATUS OF ACCELERATED TESTING OF FIXED CAPACITORS
T. G. Charles and S. Dramstad Paris ESRO Jan. 1974 109 p refs
(Contract ESTEC-609/68)
(ESRO-CR-168) Avac: NTIS HC $5.25

Acceleration factors are found for both paper and plastic capacitors in terms of temperature and applied voltage, although the acceleration factors for mica capacitors are less apparent because it is more difficult to separate temperature and voltage effects. Accelerated testing of glass capacitors were carried out by increasing both voltage (less than 5 times rated) and temperature (less than 275 C). Acceleration factors for ceramic capacitors are small and fairly consistent, but do not appear to be applicable outside the normal working range, though voltage may be increased to twice rated. Over-voltage testing is automatically limited and gives rise to variable acceleration factors for electrolytic capacitors. The accelerating effect of temperature is only slight for catastrophic failures in solid tantalum capacitors.
Author (ESRO)

N75-10474# Forsvarets Teletekniska Lab., Stockholm (Sweden).
PRESENT-DAY STATUS OF ACCELERATED TESTING OF INTEGRATED CIRCUITS
T. G. Charles Paris ESRO Jan. 1974 89 p refs
(Contract ESTEC-609/68)
(ESRO-CR-169) Avac: NTIS HC $4.75

Accelerated testing and failure modes and mechanisms of monolithic and hydrid integrated circuits are discussed. Also included are the results of stress testing on both monolithic and hydrid circuits.
ESRO

N75-10475# Forsvarets Teletekniska Lab., Stockholm (Sweden).
PRESENT DAY STATUS OF ACCELERATED TESTING OF DIODES AND TRANSISTORS
T. G. Charles Paris ESRO May 1974 72 p refs
(Contract ESTEC-609/68)
(ESRO-CR-170) Avac: NTIS HC $4.25

Results of accelerated testing and failure modes and mechanisms of semiconductor diodes and transistors are discussed. The findings indicate that no generalized acceleration factors exist for diodes or transistors. The variables are so many and so dissimilar that a factor must be determined for each specific type. Screening seems to be a valuable method of improving the reliability, but step-stress testing is of doubtful value, except for determining a safe screening level. Due to the large number of failure mechanisms involved, sufficient numbers of devices must be tested. It is in general difficult to relate long term tests to short term tests.
Author (ESRO)

N75-10476# General Telephone and Electronics Labs., Inc., Bayside, N.Y.
AN INVESTIGATION OF THE EXPERIENCE AND IMPLICATIONS OF USING NON HI-REL COMPONENTS IN EUROPEAN SCIENTIFIC EXPERIMENTS. VOLUME 1: SUMMARY
G. E. Hall and P. Brunt Jun. 1974 51 p 3 Vol.
(Contract ESRO-SC/23-HQ)
(GT-7310-Vol-1; ESRO-CR(P)-519-Vol-1) Avail: NTIS HC $4.25

The findings on a study of the experience and implications of using non-Hirel electronic parts in European scientific experiments are reported. The satellites which formed the basis of the study were the first seven ESRO satellites launched, namely ESRO 2, ESRO 1A, HEOS A1, ESRO 1B, HEOS A2, TD 1A, and ESRO 4. The success of the onboard experiments prompted a study of the standard of parts used in them, the methods of manufacture, and the pre-launch and post-launch failure records, in an attempt to identify relationships between such factors and to quantify parts performance in orbit. The study was based on detailed questionnaires sent to the experimenters whose experiments had flown in the satellites.
ESRO

N75-10477# General Telephone and Electronics Labs., Inc., Bayside, N.Y.
AN INVESTIGATION OF THE EXPERIENCE AND IMPLICATIONS OF USING NON HI-REL COMPONENTS IN EUROPEAN SCIENTIFIC EXPERIMENTS. VOLUME 2: MAIN REPORT
G. E. Hall and P. Brunt Jun. 1974 97 p refs 3 Vol.
(Contract ESRO-SC/23-HQ)
(GT-7310-Vol-2; ESRO-CR(P)-520-Vol-2) Avail: NTIS HC $4.75

The performance record of the ESRO satellite onboard experiments is analyzed, the standards of manufacture of experiments are classified, and prelaunch failures and orbital reliability are elaborated.
G.G.

N75-10478# Forsvarets Teletekniska Lab., Stockholm (Sweden).
PRESENT-DAY STATUS OF ACCELERATED TESTING OF FIXED RESISTORS Interim Report
T. G. Charles and E. Stenberg Paris ESRO Jan. 1974 83 p refs
(Contract ESTEC-609/68)
(ESRO-CR-166) Avail: NTIS HC $4.75

The accelerated life testing of several types of fixed resistors is reported. Results of stress testing along with recurrent failure mechanisms are discussed. Useful data was found for metal oxide film resistors, but the resultant acceleration factors are very dependent on the failure definitions used.
ESRO

N75-10479# Rockwell International Corp., Anaheim, Calif. Autonetics Div.
FUNGUS AND CORROSION INDUCED FAILURE MECHANISMS Final Report
E. R. Brands and F. Y. Hayashi 29 Apr. 1974 97 p refs
(Contract DAAB07-74-C-0020)
(AD-783361; C73-973.8/201) Avail: NTIS CSCL 09/5

The study was undertaken to define some of the mechanisms by which electronic equipment fails in field service and storage. Circuits were assembled under different controlled conditions and then exposed to humidity and salt fog. A simulated circuit was designed and constructed so that the device electrical parameters could be monitored during exposure to humidity, salt fog, and fungus growth. The monitored properties included moisture absorption, moisture transmission, insulation resistance, leakage currents and electrical parameters characteristic of specific devices. The contaminants which were studied included the assembly and handling soils and various activated fluxes. The effect of cleaning efficiency upon failure rates was determined. Several conformal coatings were compared for their ability to maintain reliable operation.
Author (GRA)

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N75-10480 Carnegie-Mellon Univ., Pittsburgh, Pa.
OPTIMAL MATERIAL SYSTEMS FOR FRAME BUILDINGS SUBJECTED TO SOLAR HEATING Ph.D. Thesis
Chiou-Horng Chen 1974 196 p
Avail: Univ. Microfilms Order No. 74-19307

A computerized systematic selection of multilayered materials has been developed for the optimal design of building environments to be safe, comfortable under solar inputs and economic.

By taking advantage of the best characteristics of each material and paying attention to the other material properties which do have contributions for other functions, then a superior system can be achieved. A multifactor optimization technique is used to optimize four implicit and one explicit object functions simultaneously. A biased random direct search is employed to find the best available materials with discrete properties. A direct stiffness method is applied to conduct the structural analysis. Finite element method is used in handling the heat transfer analysis due to the transient solar heat flux. Dissert. Abstr.

N75-10481 Pittsburgh Univ., Pa.
FREE AND FORCED VIBRATION OF RECTANGULAR PLATE WITH DAMPING AND ARBITRARY BOUNDARY CONDITIONS Ph.D. Thesis
Pandit Goba Patil 1974 183 p
Avail: Univ. Microfilms Order No. 74-21049

The problem of the free and forced vibration of a rectangular plate with uniform damping throughout the domain and all four edges prevented from deflecting and two opposing edges having variable torsional restoring moments while the other two edges having no restoring moment is solved using Fourier series techniques. The following types of loading are considered: (1) concentrated load at the center of the plate; (2) uniformly distributed load; and (3) uniformly distributed impulse load. An experimental study was performed to determine the damping coefficients for various materials using cantilever beam models. These damping coefficients were then used to predict the forced vibration of laminated plates. Dissert. Abstr.

N75-10482 Illinois Univ., Chicago.
STATIC AND DYNAMIC BUCKLING OF SHALLOW ARCHES Ph.D. Thesis
David Lai-Chih Lo 1974 78 p
Avail: Univ. Microfilms Order No. 74-20873

A general discussion of the static and dynamic behavior of the shallow circular arch is presented. It is first shown that, irrespective of specific loading or boundary conditions, it is possible to arrive at general conclusions regarding static buckling, postbuckling, and imperfection sensitivity. General methods of analysis are established which lead to the determination of points of bifurcation and of postbuckling paths under symmetric loads. Modifications accounting for antisymmetric load components are introduced, with special emphasis on their asymptotic and limit load effect. A typical numerical example is carried through in detail. Dissert. Abstr.

N75-10483# Tokyo Univ. (Japan). Inst. of Industrial Science.
OVERALL STUDY ON MECHANICS OF LEVELING AND STRAIGHTENING
Jin-Ichiro Araki, Hiromu Suzuki, Naomichi Yamamoto, Jitsuo Kitazawa, and Yutaka Isojima Sep. 1974 20 p refs
(Serial-149-Vol-23-No-6) Avail: NTIS HC $3.25

Optimization of leveling or straightening operations to improve dimensional accuracy of round bars and three dimensional initial curvatures is considered. G.G.

N75-10484*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
WINDOWAC (WING DESIGN OPTIMIZATION WITH AEROELASTIC CONSTRAINTS): PROGRAM MANUAL
Raphael T. Haftka and James H. Starnes, Jr. Washington Oct. 1974 188 p refs
(NASA-TM-X-3071; L-9195) Avail: NTIS HC $7.00 CSCL 20K

User and programer documentation for the WIDOWAC programs is given. WIDOWAC may be used for the design of minimum mass wing structures subjected to flutter, strength, and minimum gage constraints. The wing structure is modeled by finite elements, flutter conditions may be both subsonic and supersonic, and mathematical programing methods are used for the optimization procedure. The user documentation gives general directions on how the programs may be used and describes their limitations; in addition, program input and output are described, and example problems are presented. A discussion of computational algorithms and flow charts of the WIDOWAC programs and major subroutines is also given. Author

N75-10485*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A COMPUTER PROGRAM FOR PLOTTING STRESS-STRAIN DATA FROM COMPRESSION, TENSION, AND TORSION TESTS OF MATERIALS
Anne Greenbaum, Donald J. Baker (Army Air Mobility R and D Lab.), and John G. Davis, Jr. Washington Nov. 1974 69 p ref
(NASA-TM-X-3091; L-9384) Avail: NTIS HC $4.25 CSCL 20K

A computer program for plotting stress-strain curves obtained from compression and tension tests on rectangular (flat) specimens and circular-cross-section specimens (rods and tubes) and both stress-strain and torque-twist curves obtained from torsion tests on tubes is presented in detail. The program is written in FORTRAN 4 language for the Control Data 6000 series digital computer with the SCOPE 3.0 operating system and requires approximately 110000 octal locations of core storage. The program has the capability of plotting individual strain-gage outputs and/or the average output of several strain gages and the capability of computing the slope of a straight line which provides a least-squares fit to a specified section of the plotted curve. In addition, the program can compute the slope of the stress-strain curve at any point along the curve. The computer program input and output for three sample problems are presented. Author

N75-10486# Argonne National Lab., Ill. Reactor Analysis and Safety Div.
NONLINEAR FINITE-ELEMENT FORMULATION FOR TRANSIENT ANALYSIS OF THREE-DIMENSIONAL THIN STRUCTURES
A. H. Marchertas and T. B. Belytschko (Illinois Univ., Chicago) Jun. 1974 48 p refs
(Contract W-31-109-eng-38)
(ANL-8104) Avail: NTIS HC $3.75

A finite-element procedure for transient analysis of plates and shells in three-dimensional space, applicable to large displacements and nonlinear material properties is presented. This procedure uses a convected coordinate formulation enabling the use of a simple strain-nodal displacement, as well as nodal force-stress relations. The plate/shell element can be subjected to linear in-plane displacements and cubic transverse displacements. The orientation of lumped masses is described by unitvectors, so that arbitrarily large rotations can be treated. The discretized equations of motion are integrated explicitly in time with a central difference formula. Membrane artificial viscosity is used to stabilize occasional oscillations. Author

N75-10487# Advisory Group for Aerospace Research and Development, Paris (France).
LOW CYCLE HIGH TEMPERATURE FATIGUE
Aug. 1974 149 p refs In FRENCH and ENGLISH Presented at the 38th meeting of the Struct. and Mater. Panel, Washington, D. C., 21-26 Apr. 1974
(AGARD-CP-155) Avail: NTIS HC $5.75

The operating conditions of aircraft are discussed in terms of propulsive efficiency, especially insofar as fatigue and creep phenomena affect the performance of engines operating at high and variable temperatures, and under cyclic stresses. Low cycle high temperature fatigue studies were conducted to obtain data related to these questions. For individual titles, see N75-10488 through N75-10494.

N75-10488 Societe Nationale d'Etude et de Construction de Moteurs d'Aviation, Corbeil (France).
PROBLEMS OF LOW CYCLE HIGH TEMPERATURE FATIGUE IN AIRCRAFT JET ENGINES c07
R. Brunetaud and J. Thiery *In* AGARD Low Cycle High Temp. Fatigue Aug. 1974 11 p In FRENCH; EN%LISH summary
(For availability see N75-10487 01-39)

Low cycle fatigue resistance problems related to aircraft engine operating cycles were examined in terms of the possibility of using calculation methods in elastic and plastic ranges for testing the condition of engine parts. Metallurgical aspects of the problem are also briefly considered. Author

N75-10489* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

AN OVERVIEW OF HIGH TEMPERATURE METAL FATIGUE: ASPECTS COVERED BY THE 1973 INTERNATIONAL CONFERENCE ON CREEP AND FATIGUE

S. S. Manson (Case Western Reserve Univ.) and G. R. Halford *In* AGARD Low Cycle High Temp. Fatigue Aug. 1974 47 p refs (For availability see N75-10487 01-39)

A summary of papers is presented which covers the following broad aspects of high temperature metal fatigue: (1) materials development and characterization; (2) environmental factors, including air, vacuum, helium, iodine, sodium, and radiation environments; (3) general fatigue life relationships; (4) crack growth laws; (5) design code activities; and (6) design and service experience. Illustrative tables accompany the summary. A.A.D.

N75-10490 Newcastle-upon-Tyne Univ. (England). Dept. of Mechanical Engineering.

PRECISION IN LCHTF TESTING

E. M. Smith *In* AGARD Low Cycle High Temp. Fatigue Aug. 1974 19 p refs (For availability see N75-10487 01-39)

Fast and accurate temperature control in low cycle high temperature fatigue (LCHTF) testing depends on an accurate sensitivity to changes in stress and temperature levels, oxidation, direction, and rates of loading. Extremities of the possible test spectrum are described in terms of constitutive testing and component testing. An evaluation of thermal and stress fields within the specimen geometry, selection of appropriate heating and cooling methods, and assessment of precision of measurement under thermal and mechanical transients were all involved in the constitutive behavior testing. Coupon testing, utilizing precisely controlled thermal shocks, was used to measure component response to LCHTF conditions. Author

N75-10491 National Gas Turbine Establishment, Pyestock (England). Materials Science Dept.

THE EFFECT OF CYCLE PARAMETERS ON HIGH TEMPERATURE LOW CYCLE FATIGUE

G. F. Harrison and M. G. Cockcroft *In* AGARD Low Cycle High Temp. Fatigue Aug. 1974 15 p refs (For availability see N75-10487 01-39)

The types of information required by engine designers in the area of high temperature low cycle fatigue engine parameters are summarized, particularly concerning temperature effects, frequency and hold-time effects, and the effects of strain cycling and stress cycling. The choice of testing method is dependent on the type of analysis employed when making use of the data and the various possible approaches are compared. It is suggested that in high temperature situations there is often advantage in regarding fatigue as a creep-dominated process. Some gaps in the present state of knowledge are indicated. Author

N75-10492 Rensselaer Polytechnic Inst., Troy, N.Y. Mechanics Div.

MULTIAXIAL FATIGUE. PRESENT AND FUTURE METHODS OF CORRELATION

Erhard Krempl *In* AGARD Low Cycle High Temp. Fatigue Aug. 1974 13 p refs (For availability see N75-10487 01-39)

Multiaxial fatigue fracture criteria are viewed as surfaces in stress (strain) space which can exhibit isotropy or anisotropy. A quadratic form of the proposed equation includes the von Mises, the Sines and the Gough criteria. It is shown how this criterion can be fitted to low-cycle fatigue data, and specific methods are suggested for the experimental determination of these constants. The criterion exhibits a linear mean stress (strain) effect and the tension-torsion ratio must be less than two. Tests necessary for the determination of the orthotropic constants are outlined. A possible extension to variable amplitude loading is suggested. Author

N75-10493 Connecticut Univ., Storrs. Dept. of Metallurgy.

LIFETIME PREDICTION METHODS FOR ELEVATED TEMPERATURE FATIGUE

A. J. McEvily and S. R. Crosby *In* AGARD Low Cycle High Temp. Fatigue Aug. 1974 18 p refs (For availability see N75-10487 01-39)

Methods for lifetime prediction at elevated temperatures can be categorized as either: (1) parametric; (2) damage summation; (3) strainrange partitioning; or (4) frequency modification. The capabilities and limitations of these various approaches are discussed, and the problem of extrapolation beyond laboratory experience is considered. Author

N75-10494 Pratt and Whitney Aircraft, Middletown, Conn. Materials Engineering and Research Lab.

DESIGN PROCEDURES FOR ELEVATED TEMPERATURE LOW-CYCLE FATIGUE

C. H. Wells *In* AGARD Low Cycle High Temp. Fatigue Aug. 1974 17 p refs (For availability see N75-10487 01-39)

The state of the art review of component design against low-cycle fatigue failure at elevated temperature, covers the areas of failure criteria, nondestructive inspection, constitutive behavior, prediction of crack initiation and propagation lifetime, applicability of linear elastic fracture mechanics, and structural verification. Special problems posed by gas turbine applications are discussed, along with major gaps in understanding and techniques. Chief among these are the nondestructive characterization of surfaces and internal flaws, definition of the limitations of fracture mechanics in the regime of intergranular cracking, the prediction of mean stress and cyclic creep, and the experimental verification of analytical procedures at high temperature. Author

N75-10495*# Lockheed Missiles and Space Co., Palo Alto, Calif.

SPAR REFERENCE MANUAL

W. D. Whetstone Jun. 1974 159 p refs Sponsored in part by Army Missile Command
(Contract NAS8-26352)
(NASA-CR-120504; LMSC-D403168) Avail: NTIS HC $6.25 CSCL 20K

SPAR is a system of related programs which may be operated either in batch or demand (teletype) mode. Information exchange between programs is automatically accomplished through one or more direct access libraries, known collectively as the data complex. Card input is command-oriented, in free-field form. Capabilities available in the first production release of the system are fully documented, and include linear stress analysis, linear bgurcation buckling analysis, and linear vibrational analysis. Author

N75-10496*# Lockheed Missiles and Space Co., Sunnyvale, Calif.

SPAR DEMONSTRATION PROBLEMS

C. L. Yen, R. A. Moore, and W. D. Whetstone Jun. 1974 128 p refs Sponsored in part by Army Missile Command
(Contract NAS8-26352)
(NASA-CR-120505; LMSC-D403169) Avail: NTIS HC $5.75 CSCL 20K

A series of examples are presented to indicate some of the principal functions of the SPAR system and to illustrate SPAR's control card-data card structure. Information in the following categories is given: (1) a description of the problem and, in most cases, comparisons with analytical solutions; (2) a list of the input cards; (3) a printout of the table of contents of the direct access library into which all SPAR output was directed; and (4) a few representative plots. Author

N75-10497*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

MINIMUM-WEIGHT DESIGNS FOR HAT-STIFFENED COMPOSITE PANELS UNDER UNIAXIAL COMPRESSION

Banarsi Agarwal and Randall C. Davis Washington Nov. 1974 46 p refs
(NASA-TN-D-7779; L-9739) Avail: NTIS HC $3j75 CSCL 20K

Optimum hat-stiffened compression panel designs are determined by a structural synthesis technique. The effects of simplifying assumptions made in the buckling analysis for the optimization program are investigated by a linked plate element program. Optimization results for hat-stiffened graphite-epoxy panels show a 50-percent weight savings over optimized aluminum panels. Composite panels are shown to possess a variety of proportions at nearly constant weight. Author

N75-10498# Stanford Univ., Calg. Dept. of Materials Science and Engineering.

STRUCTURE DEPENDENCE OF HIGH TEMPERATURE DEFORMATION OF METALS Progress Report, 1 Dec. 1972 - 1 Dec. 1973
W. D. Nix and C. R. Barrett 1 Jan. 1974 85 p refs
(Contract AT(04-3)-326)
(SU-326-P-17-X-5) Avail: NTIS HC $4.75

The relation between structure and high temperature creep and creep rupture of metals was examined. Superplastic flow in the Pb-Sn eutectic; fine grained refractory metals produced by physical vapor deposition using chromium; the influence of precipitation free zones on creep ductility using Al-Zn-Mg alloys; a theory of creep rupture based on void growth by plastic deformation; and an analysis of the entropy of thermally activated dislocation glide based on the theory of thermoelasticity are summarized. Publications, reports, and dissertations produced for the year are given. NSA

N75-10499# Sandia Corp., Albuquerque, N.Mex.
RESPONSE OF A FINITE CYLINDRICAL SHELL TO A COSINE IMPULSE OVER HALF ITS CIRCUMFERENCE
M. J. Forrestal, W. K. Tucker, and W. A. VonRiesemann 1973 12 p refs Presented at the 15th Struct., Structural Dyn., and Mater. Conf., Las Vegas, Nev., 17 Apr. 1974 Sponsored by AEC
(SLA-73-5827; Conf-740412-1) Avail: NTIS HC $3.25

The elastic response of circular cylindrical shells with free ends loaded by a cosine impulse over half its circumference is examined experimentally and analytically. Aluminum shells with two geometries were loaded by magnetically propelled composite flyer plates consisting of 32 mils of polyethylene and 6 mils of soft aluminum. The momentum of the flyer plate was measured with pin switches, and the momentum delivered to the cylinders was obtained by rigid body motion measurements. Circumferential straintime histories at the cylinder midlengths and 180 degrees from the peak impulse intensity were obtained and compared with results from finite element computer codes. Author (NSA)

N75-10500# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Section Construction Metallique.
PLANE STRAIN FRACTURE TOUGHNESS TESTING ON CENTER-CRACKED PLATES UNDER UNIFORM TENSION
William Provost and Peter Verstraeten May 1974 35 p refs Sponsored by Inst. pour l'Encour. de la Rech. Sci. dans l'Ind. et l'Agr.
(CRIF-MT-91) Avail: NTIS HC $3.75

The testing of center-cracked specimens for determination of the plain strain fracture toughness is dealt with. The tested materials were polymethylmethacrylate and mild steel, embrittled by strain aging. The fracture mechanics formulas lead to an acceptable material constant fracture toughness for both the materials. The results of the tests on the embrittled steel showed a rather high scatter, which argues for much caution when using fracture toughness values in practice. Author (ESRO)

N75-10501# Institut fuer Festkoerpermechanik, Freiburg (West Germany).
INTERACTION BETWEEN PARALLEL CRACKS IN LAYERED COMPOSITES
M. Ratwani (Lehigh Univ., Bethlehem, Pa.) and G. D. Gupta (Lehigh Univ., Bethlehem, Pa.) May 1973 28 p refs
(WB-5/73) Avail: NTIS HC $3.75

The plane strain was of a multilayered composite with parallel cracks was considered. The interaction between parallel and collinear cracks was studied. The problem was formulated in terms of a set of simultaneous singular integral equations which are solved numerically. The effect of material properties on the interaction between cracks was demonstrated. Author (ESRO)

N75-10502# Institut fuer Festkoerpermechanik, Freiburg (West Germany).
[ACTIVITIES OF THE SOLID STATE TECHNOLOGY INSTITUTE] Annual Report, 1973 [JAHRESBERICHT 1973]
1974 43 p refs In GERMAN
Avail: NTIS HC $3.75

Activities in 1973 of the Solid State Mechanics Institute of Fraunhofer-Gesellschaft e.V., Freiburg i. Br., Germany, are presented. Research concentrated on stress analysis of loaded bodies, behavior of metallic structural members, behavior of nonmetallic structural members, and materials performance under the influence of dynamic forces. ESRO

N75-10503# Royal Aircraft Establishment, Farnborough (England). Structures Dept.
FATIGUE ENDURANCE, CRACK SENSITIVITY AND NUCLEATION CHARACTERISTICS OF STRUCTURAL ELEMENTS IN FOUR ALUMINIUM-COPPER ALLOYS
F. E. Kiddle London Aeron. Res. Council 1974 89 p refs Supersedes RAE-TR-72107; ARC-34195
(ARC-CP-1259; RAE-TR-72107; ARC-34195) Avail: NTIS HC $4.75; HMSO £L1.40; PHI $5.80

Four aluminum-copper alloys in the form of notched, lug and joint specimens were tested under constant amplitude loading at ambient temperature. While there are certain differences in fatigue performance between materials, particularly in the mean endurance and scatter of notched specimens, there is little difference between the materials in terms of the minimum fatigue endurances observed. The performance of the different types of specimen were compared and conclusions reached on the effect of fretting. The patterns of nucleation on the fatigue fracture surfaces show that scatter in endurance is associated with the number of discrete sites of crack nucleation and that in all alloys there is a transition from single to multiple crack nucleation at a value of local stress amplitude related to the static strength. Study of fatigue fracture areas at failure indicated that crack sensitivity was similar in three alloys and lower in the fourth. Author (ESRO)

N75-10504# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
AN EXPERIMENTAL INVESTIGATION OF UNSYMMETRIC CRACK TIP DEFORMATION FIELDS IN MATERIALS WITH NONUNIFORM PROPERTIES Interim Report, 1 Jan. - 1 Jul. 1974
K. L. Reifsnider and P. Nair Jul. 1974 34 p refs
(Contract DAAF07-69-C-0444; Proj. 3032871)
(AD-784136; VPI-ESM-DoD-1) Avail: NTIS CSCL 20/11

An experimental investigation of elastoplastic crack tip deformation fields is carried out in aluminum specimens having one-dimensional variations in material strength in the vicinity of the crack tip in directions skewed to the crack axis. A comparison of the measured strains with proposed analytical results is presented. Author (GRA)

N75-10505# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
LOSS OF STABILITY OF A CYLINDRICAL SHELL ON LONGITUDINAL IMPACT
A. B. Efimov, V. I. Malyi, and S. A. Utfshev 27 Jun. 1974 12 p refs Transl. into ENGLISH from Mekh. Tverd. Tela (Moscow), no. 1, 1971 p 20-23
(AD-783570; FTD-HT-23-1505-74) Avail: NTIS CSCL 20/11

It was shown that the stability loss of a cylindrical shell on longitudinal impact against the end by an infinite mass is axisymmetric at the initial instant of bulging. The found theoretical wavelengths and the actual fact of the axisymmetric state of the initial stage of bulging are in good agreement with the known experimental data. GRA

N75-10506# Battelle Columbus Labs., Ohio.
THE COLLECTION, GENERATION, AND ANALYSIS OF MIL-HDBK-5 ALLOWABLE DESIGN DATA Annual Report, 15 Feb. 1973 - 15 Feb. 1974
Paul E. Ruff and Walter S. Hyler May 1974 66 p refs
(Contract F33615-73-C-5053)
(AD-783616; AFML-TR-74-67) Avail: NTIS CSCL 11/6

The annual report describes highlights of the activities, and progress of the MIL-HDBK-5 program from February 15, 1973, through February 15, 1974. The Military Standardization Handbook, MIL-HDBK-5B, Metallic Materials and Elements for Aerospace Vehicle Structures, is recognized as the primary source for design allowable data by the Department of Defense (DoD) and other Government agencies responsible for aerospace vehicle design. The Handbook contains design allowable data on metallic materials, fasteners, joints, and other structural elements. A fatigue data consolidation and statistical analysis procedure was

developed. The method of analysis was tested on collections of fatigue data for 2024 and 7075 aluminum alloys, Ti-6Al-4V alloy, and 300M steel with generally good results. Topics studied include fracture toughness stress corrosion and stress strain relations. GRA

N75-10507# Illinois Univ., Urbana. Dept. of Theoretical and Applied Mechanics.

SIGNIFICANCE OF CYCLIC HISTORY DEPENDENT DEFORMATION PHENOMENA OF METALS ON FATIGUE LIFE ESTIMATION Report for 15 Jun. 1972 - 14 Jun. 1974

H. R. Jhansale Jun. 1974 34 p refs

(Grants DAHC15-72-G-0010; DAC15-73-G-0007; ARPA Order 2169)

(AD-784297; T/AM-391; UILU-ENG-74-6013) Avail: NTIS CSCL 11/6

Simple calculations for determining estimated extremes in fatigue life of metals with or without accounting for cycle dependent hardening, softening and mean stress relaxation in fatigue analysis, are presented. These calculations aid in assessing the importance of cyclic deformation properties in cumulative damage procedures. An SAE 1045 quenched and tempered steel is considered for illustration. In general cycle dependent deformation phenomena may be important only in intermediate and long life situations. The sensitivity of predicted life to cyclic hardening or softening depends on the degree of hardening or softening a material exhibits, whereas in the case of mean stress relaxation it depends on the shape of the cyclic stress-strain curve or the strain hardening exponent. However the need for a proper accounting of cyclic history, recognized as the cycle counting problem in fatigue literature, is the most important requisite of a cumulative damage analysis. Two alternative approaches of dealing with the cycle counting problem are discussed. Author (GRA)

N75-10508# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

METHODS OF FINITE ELEMENTS IN ANALYSES OF CONTINUOUS AND COMBINED CONSTRUCTIONS

Z. I. Bruman 19 Jul. 1974 37 p refs Transl. into ENGLISH from Issled. po Teorii Plastin i Obolochek (USSR) v. 9, 1972 p 93-118

(AD-783969; FTD-MT-24-342-74) Avail: NTIS CSCL 20/11

Use of the method of finite elements in design are discussed. It is shown that the method of finite element consists of the use of methods of structural mechanics for obtaining an approximate solution to the problems of continuum mechanics. The method of machine analysis and the program, written in the algorithmic FORTRAN language, are described in detail. M.C.F.

N75-10509# Naval Ship Research and Development Center, Annapolis, Md.

THE EFFECTS OF WELDING AND VARIOUS POSTWELD TREATMENTS ON THE LOW-CYCLE FATIGUE BEHAVIOR OF 5086-H116 AND 5456-H117 ALUMINUM ALLOYS Research and Development Report

John G. Macco Aug. 1974 31 p

(SF43422703)

(AD-784392; NSRDC-4411) Avail: NTIS CSCL 11/6

Low-cycle flexural fatigue tests were conducted on 1-inch-thick 5086-H116 and 5456-H117 aluminum alloy plates to provide engineering data for use in the hull design of high performance surface ships. The results indicate that fatigue life is similar for both alloys despite strength differences, slightly reduced by the presence of sea water; appreciably reduced due to welding; significantly improved by grinding, but only if the ground surfaces are free of porosity; and unaffected by either mechanical peening or a postweld remelt treatment. (Modified author abstract) GRA

N75-10510# Princeton Univ., N.J. Dept. of Civil and Geological Engineering.

ON THE NON-EXISTENCE OF ADJACENT EQUILIBRIUM STATES AT BIFURCATION POINTS

Arnold D. Kerr and Russel Brantman Mar. 1974 34 p refs (Contract F44620-74-C-0037; AF Proj. 9782)

(AD-783336; RR-74-SM-1; AFOSR-74-1290TR) Avail: NTIS CSCL 20/11

In the adjacent equilibrium method of stability theory, it is assumed that, at a critical point on an equilibrium branch, there always exists for the same load, in addition to the fundamental equilibrium configuration, also adjacent equilibrium states. In the present paper, it is shown that for a number of structures adjacent equilibrium states indeed do not exist at bifurcation points, thus proving that adjacent equilibrium states do not exist in general and hence that the physical argument of the adjacent equilibrium method is not generally valid. The proofs are based on the regular perturbation method. GRA

N75-10511# Polytechnic Inst. of Brooklyn, N.Y. Dept. of Aerospace Engineering and Applied Mechanics.

ANALYSIS OF A SHALLOW SPHERICAL SHELL CONTAINING AN ASYMMETRICALLY LOCATED RING STIFFENED CIRCULAR HOLE SUBJECTED TO AN ARBITRARILY LOCATED CONCENTRATED LOAD

Allan B. Pifko and Martin A. Goldberg May 1974 209 p refs (Contract F44620-74-C-0047)

(AD-783351; PINY-AE/AM-74-5; AFOSR-74-1295TR) Avail: NTIS CSCL 20/11

This investigation studies the state of stress in a shallow spherical shell containing an asymmetrically located stiffened circular hole subjected to an arbitrarily located concentrated load. Two aspects of this problem were studied. The first is the investigation of the effect of a stiffening ring on the stresses in the vicinity of the hole when the shell is undergoing severe deformation due to an eccentrically applied concentrated load. In the second, the interaction of the hole with the outer boundary is studied for cases where the hole is located near the outer edge. For this case, the hole is placed close enough to the outer edge so that the perturbed stress field due to the hole is not fully decayed before it reaches the outer boundary. (Modified author abstract) GRA

N75-10512# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

LARGE DEFLECTIONS OF THIN ELASTIC PLATES

V. V. Nekhotyaev and A. V. Sachenkov 25 Jun. 1974 35 p refs Transl. into ENGLISH from Issled. Teorii Plastin Obolochek (USSR), no. 8, 1972 p 42-76

(AD-783047; FTD-MT-24-355-74) Avail: NTIS CSCL 20/11

The article gives a summary of a study of large deflections of plates, subjected to the action of evenly distributed transverse load. GRA

N75-10513# Army Foreign Science and Technology Center, Charlottesville, Va.

EXTREMAL BOUNDARY VALUE PROBLEMS IN THE THEORY OF PLASTICITY

A. M. Protsenko 7 Nov. 1973 9 p refs Transl. into ENGLISH from Mekh. Tverdogo Tela (USSR), v. 15, no. 5, 1972 p 28-32

(AD-784172; FSTC-HT-23-1377-73) Avail: NTIS CSCL 20/11

In the theory of small deformations, the breaking load for an elastic-plastic body is equivalent to the limiting load for a rigid-plastic body. The problem of the carrying capacity of an elastic-plastic body is solved on this basis, using the limiting equilibrium method. The solution is carried through all the way to the construction of the actual stress fields and displacement. Mathematical programming apparatus is used. The construction of the limiting stress field is carried out by means of regularizing an extremal boundary value problem, which is necessary to resolve the non-uniqueness of the stress field in the limiting equilibrium problem of a rigid-plastic body. The solution of the problem is illustrated on the example of a boundary problem for a generalized plane stressed state. GRA

N75-10514# Army Foreign Science and Technology Center, Charlottesville, Va.

MECHANICS OF A DEFORMED SOLID

L. I. Sedova, M. A. Lavrenteva, G. K. Mikhailova, N. I. Muskhelishvili, and G. G. Cherog 17 Jun. 1974 576 p refs Transl. into ENGLISH of the book "Mekhanika v SSSR za 50 let" USSR, v. 3 p 5-467

(AD-784209; FSTC-HT-23-1825-73) Avail: NTIS CSCL 20/11

The book gives a cursory survey of the major trends in the mechanics of solids in the USSR over the past 50 years. The major topics discussed are: Linear elasticity theory, nonlinear elasticity theory, plasticity theory, creep theory, the creep of aging materials, the mechanics of soils, the theory of elastic shells and plates, the dynamics of deformable solids, the stability of elastic and non-elastic systems and the mechanics of fracture. GRA

N75-10222 Joint Publications Research Service, Arlington, Va.
INVESTIGATING THE QUALITY OF WELDED ELECTROSLAG JOINTS OF ROTORS 1500 MM IN DIAMETER OF 25(KHN3MF) STEEL OF ELECTROSLAG AND ELECTROFURNACE SMELTING

B. I. Medovar, V. P. Andreyev, V. V. Kosyan, A. N. Sevruk, Yu. G. Yemelyanenko, V. V. Chernykh, Yu. V. Sobolev, A. I. Shavrin, and E. Yu. Kolpishon *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 54-62 refs Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 109-118 (For availability see N75-10212 01-26)

42 GEOSCIENCES (GENERAL)

N75-10515 State Univ. of New York, Buffalo
HYDRAULIC MODEL STUDY OF SURFACE AND SUBSURFACE WIND-DRIVEN CURRENTS IN LAKE ONTARIO Ph.D. Thesis

Chih-yen Li 1974 182 p
Avail: Univ. Microfilms Order No. 74-20004

A rotating, vertically distorted Froude model was used to study the surface and subsurface currents in Lake Ontario during the cold season and the warm season. Simulation of summer stratification was achieved using two immiscible liquids which served as visible tracers of the currents when a d.c. voltage was imposed across subsurface wires in the solution. Patterns were obtained for the homogeneous lake with applications of various wind stresses at velocities of 2.94, 4.16 and 5.8 fps; and 0.5, 1.0, 2.94, 4.16 fps for the stratified lake. Model wind velocities were simulated by drawing air across the lake surface using exhaust fans. Data for individual basins were recorded by means of time-lapse motion picture photography. Dissert. Abstr.

N75-10516# Committee on Commerce (U. S. Senate).
EARTHQUAKES

Washington GPO 1974 133 p Hearings on S. 1473 and S. 1474 before Subcomm. on Oceans and Atmosphere of Comm. on Commerce, 93d Congr., 1st Sess., 26-27 Apr. 1973
(GPO-28-577) Avail: Subcomm. on Oceans and Atmosphere

A research program is considered to provide a sound physical basis and an operational system for predicting damaging earthquakes in heavily populated areas of California and Nevada. Author

N75-10517*# Kanner (Leo) Associates, Redwood City, Calif.
RIVERS OF THE PAST: CREATORS OF OIL

G. V. Obediyentova Washington NASA Oct. 1974 24 p refs Transl. into ENGLISH from Priroda (USSR), no. 7, 1974 p 28-37
(Contract NASw-2481)
(NASA-TT-F-15974) Avail: NTIS HC $3.25 CSCL 08G

The discovery, mapping, and changing flows of the ancient rivers of the Russian plain are discussed and illustrated. It is shown that many of the known oil deposits of European Russia were formed in the deltas and shallow water shelves of the paleorivers. Changes in the courses and deltas of the paleorivers are explained by tectonic movements and sea advances and retreats affecting the Russian platform. Formation of oil is indicated to be most promising where there is long-term stability in the position of river deltas and shallow marine and lake waters, and subsequent prolonged submergence of alluvial and delta sediments. Author

N75-10518# Joint Publications Research Service, Arlington, Va.
SOVIET BLOC RESEARCH IN GEOPHYSICS, ASTRONOMY, AND SPACE, NO. 334

11 Oct. 1974 28 p Transl. into ENGLISH from Russian reports 2sap HC $3.75
(JPRS-63186) Avail: NTIS

Translations and abstracts of articles are reported on meteorology, oceanography, upper atmosphere and space research, astronomy and terrestrial geophysics, covering both science news and formal scientific reports. Published details of Soviet space spectaculars are included. Author

N75-10519*# Kanner (Leo) Associates, Redwood City, Calif.
WATER ELUTION OF ORGANIC MATTER IN THE NORTHERN TAIGA FORESTS OF THE KOLA PENINSULA

K. N. Manakov, ed. and A. V. Baranovskaya Washington NASA Oct. 1974 24 p refs Transl. into ENGLISH from the book "Pochvennye Rezhimy na Polyarnom Severe" Leningrad, Nauka Press, 1969 p 104-117
(Contract NASw-2481)
(NASA-TT-F-15981) Avail: NTIS HC $3.25 CSCL 08H

An attempt was made to present the general pattern of the migration of primary elements in landscapes based on theoretical considerations, and to compare available data on the chemical composition of soils, soil forming rocks, vegetation, and soil ground water. Author

N75-10520# Environmental Data Service, Boulder, Colo.
UNITED STATES EARTHQUAKES, 1972

Jerry L. Coffman, ed. and Carl A. VonHake, ed. 1974 126 p refs
Avail: SOD HC $2.30

All earthquakes that were felt in the United States and nearby territories during the year are listed chronologically by region: (1) Northeastern Region; (2) Eastern Region; (3) Central Region; (4) Western Mountain Region; (5) Calgornia and Western Nevada; (6) Washington and Oregon; (7) Alaska; (8) Hawaii; (9) Panama Canal Zone; (10) Puerto Rico; and (11) Virgin Islands. Epicenters of instrumentally determined eqrthquakes that were not felt by residents are listed, along with principal earthquakes of the world for the year, including brief accounts of their effects. Instrumental data utilized in computing earthquake epicenters, depths, magnitudes, and times of occurrence are obtained from NOAA and cooperating seismological observatories, both domestic and foreign. Author

N75-10521*# Kanner (Leo) Associates, Redwood City, Calif.
TRANSFORMATION OF ORGANIC SUBSTANCES IN SOIL

B. Novak Washington NASA Oct. 1974 22 p Transl. into ENGLISH from the book "Organicheskiye Udobreniya" Moscow, 1972 p 106-123
(Contract NASw-2487)
(NASA-TT-F-15985) Avail: NTIS HC $3.25 CSCL 08M

The results are presented of several series of tests on mineralization and humification of organic matter in the soil, including the addition of materials of varying complexity (starch, casein, alfalfa meal, wheat straw, cellulose) and aeration conditions, and the use of N and P alone and together, as well as with and without manure application to the soil. A considerable amount of test data is presented in tables and graphs, along with several numerical ratios of various test parameters. Results are explained in terms of various simple thermodynamic relationships, especially the involvement of high-energy phosphate bonds and ATP in biological activity. The results are useful in preparation of organic fertilizers and regulation of change in organic substances in the soil by microorganisms. Author

N75-10522# California Univ., Berkeley. Lawrence Berkeley Lab.
RESEARCH HIGHLIGHTS 1974 FISCAL

Sep. 1974 64 p refs
(Contract W-7405-eng-48)
(Publ-84/7M) Avail: NTIS HC $4.25

Activities at the University of California Lawrence Berkeley Laboratory are fully described, and are accompanied by photographs which illustrate the most important developments in the following areas: (1) air pollution control; (2) catalytic surfaces;

(3) ozone effects of the supersonic transport aircraft; (4) geothermal power conversion; (5) medical research on Fanconi's Anemia, cancer cell metabolism, and nuclear medicine; (6) positron-electron-proton accelerator and SuperHILAC accelerator design; and (7) physics experiments on baryon resonances, helium-like atoms, spin effects, and high energy carbon reactions. Tables are also provided which show summary figures for annual manpower and financial data. A.A.D.

N75-10523# Massachusetts Inst. of Tech., Cambridge. Dept. of Meteorology.
TRANSPORT PROCESSES AND TRACE CONSTITUENTS IN THE STRATOSPHERE Annual Progress Report
D. M. Cunnold 15 Mar. 1974 91 p refs
(Contract AT(11-1)-2249)
(COO-2249-3) Avail: NTIS HC $4.75

Progress in three areas is reported: numerical modeling, stratospheric data analysis, and the effects of trace constituents on heating rates. A general circulation model being developed with the ultimate objective of assessing the effect of SST operations on the atmospheric ozone distribution is reported. The model variables are represented in the spectral domain using 79 spherical harmonics and 26 vertical levels between the ground and 70 km. The results of a three year integration (run 12) to simulate the unperturbed global ozone distribution are presented. The model shows the presence of a westerly stratospheric jet in the winter hemisphere with amplitude similar to those observed in the polar night jet; easterlies dominate in the summer hemisphere. The model also shows ozone to be transported polewards and downwards. NSA

N75-10524# Informatics, Inc., Rockville, Md.
SOVIET SATELLITE GEODESY: BASIS AND STATUS OF SOVIET LASER GEODESY AND LONG-BASE LINE INTERFEROMETRY Interim Report
Stuart G. Hibben and Eleanor M. Rowell 15 May 1974 262 p refs
(Contract F44620-72-C-0053)
(AD-781138/3; AFOSR-74-0962TR) Avail: NTIS HC $6.50 CSCL 08/5

Soviet developments in satellite geodesy are described in a survey of the literature, and by reports on observation and tracking stations, space triangulation networks, cameras used for satellite geodesy, laser geodesy, and long baseline interferometry. GRA

N75-10525# Bureau of Mines, Bartlesville, Okla. Energy Research Center.
GEOCHEMISTRY OF LIQUIDS, GASES, AND ROCKS FROM THE SMACKOVER FORMATION
A. Gene Collins Apr. 1974 90 p refs
(PB-233427/4; BM-RI-7897) Avail: NTIS HC $4.00 CSCL 08D

Samples of oil, gas, brine, and rock were collected from the Smackover Formation and analyzed to determine what geochemical relationships are useful in exploration for, and production of oil and gas. The results were correlated and interpreted, and several geochemical relationships useful in exploration and production were found, including the type and class of brine, organic constituents in the brine, redox potential, in situ temperature and pressure of brine, degree of sulfate and carbonate saturation of brine, and halide concentrations in the brine. (Modified author abstract) GRA

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N75-10526*# Cornell Univ., Ithaca, N.Y.
EVALUATION OF SKYLAB IMAGERY AS AN INFORMATION SERVICE FOR INVESTIGATING LAND USE AND NATURAL RESOURCES Monthly Progress Report, Jul. 1974
Ernest Hardy, Principal Investigator, James Skaley, and Elmer Phillips 31 Jul. 1974 3 p Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(Contract NAS9-13364)
(E74-10730; NASA-CR-139576) Avail: NTIS HC $3.25 CSCL 08B

There are no author-identified significant results in this report.

N75-10527*# Environmental Research Inst. of Michigan, Ann Arbor.
DEVELOPING PROCESSING TECHNIQUES FOR SKYLAB DATA Monthly Progress Report, Sep. 1974
Richard F. Nalepka and William A. Malila, Principal Investigators 14 Oct. 1974 5 p EREP
(Contract NAS9-13280)
(E74-10799; NASA-CR-140493; ERIM-101900-40-L) Avail: NTIS HC $3.25 CSCL 05B

There are no author-identified significant results in this report.

N75-10528*# Geological Survey, Reston, Va.
OVERALL EVALUATION OF ERTS-1 IMAGERY FOR CARTOGRAPHIC APPLICATION Final Report, 1 Jul. 1972 - 30 Jun. 1974
Alden P. Covocoresses, Principal Investigator 1 Jul. 1974 69 p refs Original contains imagery. Original photography contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(NASA Order S-70243-AG)
(E74-10800; NASA-CR-140494) Avail: NTIS HC $4.25 CSCL 08B

The author has identified the following significant results. The conclusion reached is that an ERTS-type satellite has widespread cartographic application for scales of 1:250,000 and smaller. ERTS imagery also indicates those areas requiring revision at larger scales. For optimum cartographic application, ERTS must be flown continuously as temporal change (seasonal and long term) detection requires comparative coverage. ERTS is the first imagery system that lends itself to automated mapping wherein cartographic products may be produced in a matter of days rather than in months or years.

N75-10529*# National Oceanic and Atmospheric Administration, Miami, Fla.
REMOTE SENSING OF OCEAN CURRENT BOUNDARY LAYER Monthly Progress Report, Sep. 1974
George A. Maul, Principal Investigator Sep. 1974 2 p EREP
(NASA Order T-4713-B)
(E74-10801; NASA-CR-140495) Avail: NTIS HC $3.25 CSCL 08C

There are no author-identified significant results in this report.

N75-10530*# Colorado School of Mines, Golden. Dept. of Geology.
GEOLOGIC AND MINERAL AND WATER RESOURCES INVESTIGATIONS IN WESTERN COLORADO, USING SKYLAB EREP DATA Monthly Progress Report, Sep. 1974
Keenan Lee, Principal Investigator Sep. 1974 4 p EREP
(Contract NAS9-13394)
(E74-10802; NASA-CR-140496) Avail: NTIS HC $3.25 CSCL 08G

There are no author-identified significant results in this report.

N75-10531*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
AN INTERDISCIPLINARY ANALYSIS OF MULTISPECTRAL SATELLITE DATA FOR SELECTED COVER TYPES IN THE COLORADO MOUNTAINS, USING AUTOMATIC DATA PROCESSING TECHNIQUES Monthly Progress Report, Sep. 1974
Roger M. Hoffer, Principal Investigator Sep. 1974 5 p EREP
(Contract NAS9-13380)
(E74-10803; NASA-CR-140497) Avail: NTIS HC $3.25 CSCL 08F

There are no author-identified significant results in this report.

N75-10532*# National Oceanic and Atmospheric Administration, Rockville, Md.
SKYLAB A PROPOSAL AEROTRIANGULATION WITH VERY SMALL SCALE PHOTOGRAPHY Quarterly Report, 15 Jul. - 15 Oct. 1974
Morton Keller, Principal Investigator 15 Oct. 1974 1 p EREP
(NASA Order T-4110-B)
(E74-10804; NASA-CR-140498) Avail: NTIS HC $3.25 CSCL 08B

There are no author-identified significant results in this report.

N75-10533*# National Research Council, Bangkok (Thailand).
THAILAND NATIONAL PROGRAMME OF THE EARTH RESOURCES TECHNOLOGY SATELLITE
Pradisth Cheosakul, Principal Investigator Aug. 1973 14 p Sponsored by NASA ERTS
(E74-10806; NASA-CR-140500) Avail: NTIS HC $3.25 CSCL 08F

There are no author-identified significant results in this report.

N75-10534*# National Research Council, Bangkok (Thailand).
THE THAILAND PROGRAMME OF THE EARTH RESOURCES TECHNOLOGY SATELLITE Progress Report
Pradisth Cheosakul, Principal Investigator [1974] 3 p Sponsored by NASA ERTS
(E74-10807; NASA-CR-140501; PR-1) Avail: NTIS HC $3.25 CSCL 08F

There are no author-identified significant results in this report.

N75-10535*# Boeing Co., Kent, Wash.
QUANTITATIVE DETERMINATION OF STRATOSPHERIC AEROSOL CHARACTERISTICS Monthly Report, Sep. 1974
David L. Tingey, Principal Investigator Sep. 1974 1 p EREP
(Contract NAS9-13303)
(E74-10808; NASA-CR-140502) Avail: NTIS HC $3.25 CSCL 04A

There are no author-identified significant results in this report.

N75-10536*# New York State Museum and Science Service, Albany.
ASSESSMENT OF ERTS-1 IMAGERY AS A TOOL FOR REGIONAL GEOLOGICAL ANALYSIS IN NEW YORK STATE Final Report
Yngvar W. Isachsen, Principal Investigator, Robert H. Fakundiny, and Stephen W. Forster 28 May 1974 181 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21764)
(E74-10809; NASA-CR-140503) Avail: NTIS HC $7.00 CSCL 08G

The author has identified the following significant results. Linear anomalies dominate the new geological information derived from ERTS-1 imagery, total lengths now exceeding 26,500 km. Maxima on rose diagrams for ERTS-1 anomalies correspond well with those for mapped faults and topographic lineaments. Multi-scale analysis of linears shows that single topographic linears at 1:2,500,000 may become dashed linears at 1:1,000,000 aligned zones of shorter parallel, en echelon, or conjugate linears at 1:5000,000, and shorter linears lacking any conspicuous zonal alignment at 1:250,000. Field work in the Catskills suggests that the prominent new NNE lineaments may be surface manifestations of dip slip faulting in the basement, and that it may become possible to map major joint sets over extensive plateau regions directly on the imagery. Most circular features found were explained away by U-2 airfoto analysis but several remain as anomalies. Visible glacial features include individual drumlins, drumlinoids, eskers, ice-marginal drainage channels, glacial lake shorelines, sand plains, and end moraines.

N75-10537*# Tennessee Univ., Knoxville. Dept. of Geography.
GEOGRAPHIC APPLICATIONS OF ERTS-1 IMAGERY TO LANDSCAPE CHANGE Final Report
John B. Rehder, Principal Investigator Dec. 1973 112 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21726)
(E74-10810; NASA-CR-140504) Avail: NTIS HC $5.25 CSCL 08F

The author has identified the following significant results. ERTS-1 has proven to be an effective earth-orbiting monitor of landscape change. Its regional coverage for large areal monitoring has been effective for the detection and mapping of agricultural plowing regions, for general forest cover mapping, for flood mapping, for strip mine mapping, and for short-lived precipitation mapping patterns. Paramount to the entire study has been the temporal coverage provided by ERTS. Without the cyclic coverage on an 18 day basis, temporal coverage would have been inadequate for the detection and mapping of strip mining landscape change, the analysis of agricultural landscape change based on plowing patterns, the analysis of urban-suburban growth changes, and the mapping of the Mississippi River floods. Cost benefits from ERTS are unquestionably superior to aircraft systems in regard to large regional coverage and cyclic temporal parameters. For the analysis of landscape change in large regions such as statewide areas or even areas of 10,000 square miles, ERTS is of cost benefit consideration. Not only does the cost of imagery favor ERTS but the reduction of man-hours using ERTS has been in the magnitude of 1:10.

N75-10538*# Tennessee Univ., Knoxville. Dept. of Electrical Engineering.
ERTS-1 IMAGERY INTERPRETATION TECHNIQUES IN THE TENNESSEE VALLEY Final Report, Sep. 1972 - Mar. 1974
Robert E. Bodenheimer, Principal Investigator Apr. 1974 59 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21875)
(E74-10811; NASA-CR-140505; TR-EE/CS-74-5) Avail: NTIS HC $4.25 CSCL 08B

The author has identified the following significant results. The feasibility of delineating major soil associations and land uses through computerized analyses is discussed. Useful and potential applications in detecting landscape change and land use mapping are described. Recommendations for improving the data processing effort in a multidisciplinary program are presented.

N75-10539*# Geological Survey, Tacoma, Wash.
EVALUATE ERTS IMAGERY FOR MAPPING AND DETECTION OF CHANGES OF SNOWCOVER ON LAND AND ON GLACIERS Semiannual Progress Report, 1 Jan. - 30 Jun. 1973
Mark F. Meier, Principal Investigator 1 Jul. 1973 7 p ERTS
(NASA Order S-70243-AG)
(E74-10812; NASA-CR-140569) Avail: NTIS HC $3.25 CSCL 08L

The author has identified the following significant results. A new procedure to determine snowcovered areas has been devised. Aside from problems in heavily forested areas this method shows promise in predicting snowmelt runoff from mountain areas and will also assist in energy balance modeling of large snowfields. Snowcover results compare favorably with measurements made by high altitude aircraft photography. Changes in snowcover in areas as small as 3 x 5 km can be determined from ERTS-1 images by both optical and electronic methods. Snowcover changes determined by these two methods in the experimental South Cascade Glacier Basin were verified by field mapping. Image enahancement techniques on ERTS-1 images of large Alaskan glaciers (the Hubbard, Yentna, and Kahiltna) have given new insights into the large-scale structures and flow dynamics of these potentially hazardous glaciers. The Hubbard Glacier, in particular, is one which poses a threat to man and should be monitored for future changes.

N75-10540*# Geological Survey, Miami, Fla.
SURFACE WATER MODELING EVERGLADES WATER BASIN, FLORIDA Bimonthly Progress Report, 1 May - 30 Jun. 1974
Aaron L. Higer, Principal Investigator, E. T. Wimberly, E. H. Cordes, and A. E. Coker Jul. 1974 4 p ERTS
(NASA Order S-70243-AG-7)
(E74-10814; NASA-CR-140616) Avail: NTIS HC $3.25 CSCL 08H

There are no author-identified significant results in this report.

N75-10541*# Geological Survey, Reston, Va.
DYNAMICS OF SUSPENDED SEDIMENT PLUMES IN LAKE ONTARIO Semiannual Progress Report, 1 Jan. - 30 Jun. 1974
Edward J. Pluhowski, Principal Investigator 1 Jul. 1974 4 p ERTS
(NASA Order S-70243-AG-2)
(E74-10815; NASA-CR-140617) Avail: NTIS HC $3.25 CSCL 08H

The author has identified the following significant results. Although turbidity plumes in Lake Ontario are usually not visible during the winter, meteorologic and hydrologic events may combine to ensure their detection. The clearly defined Niagara River plume of January 25, 1974, was the result of turbid water entering the river at its source near the eastern end of Lake Erie. A persistent southwest wind mild temperature resulted in a pile-up of ice free but turbid water at the source of the Niagara River where the highly colored water entered the river. Upon discharge into Lake Ontario, the Niagara River water appears several shades lighter in tone than the ambient lake water. On February 12, 1974, eastward moving ice floes along the Ontario shoreline were forced to move around the hydraulic barrier created by the Niagara River jet. As a result the Niagara River plume was clearly portrayed by a halo-like band of slush ice borne by wind-driven nearshore currents.

N75-10542*# American Univ., Washington, D.C. Dept. of Biology.
SKYLAB-EREP INVESTIGATIONS OF WETLANDS ECOLOGY Bimonthly Progress Report, 6 Aug. - 6 Oct. 1974
Richard R. Anderson, Principal Investigators, Virginia P. Carter, and Linda J. Alsid 6 Oct. 1974 4 p EREP
(Contract NAS1-12209)
(E74-10816; NASA-CR-140618) Avail: NTIS HC $3.25 CSCL 08A

There are no author-identified significant results in this report.

N75-10543*# Northern Prairie Wildlife Research Center, Jamestown, N. Dak.
UTILIZATION OF SKYLAB (EREP) SYSTEM FOR APPRAISING CHANGES IN CONTINENTAL MIGRATORY BIRD HABITAT Monthly Progress Report, Oct. 1974
David S. Gilmer, Principal Investigator Oct. 1974 4 p EREP
(NASA Order T-4114-B)
(E74-10817; NASA-CR-140619) Avail: NTIS HC $3.25 CSCL 06C

There are no author-identified significant results in this report.

N75-10544*# Arizona Univ., Tucson. Office of Arid Lands Studies.
A STUDY TO EXPLORE THE USE OF ORBITAL REMOTE SENSING TO DETERMINE NATIVE ARID PLANT DISTRIBUTION Biannual Progress Report and Final Report
W. G. McGinnies, Principal Investigator, L. K. Lepley, E. F. Haase, J. S. Conn, H. B. Musick, and K. E. Foster Aug. 1974 38 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21812)
(E74-10818; NASA-CR-140620) Avail: NTIS HC $3.75 CSCL 08F

The author has identified the following significant results. It is possible to determine, from ERTS imagery, native arid plant distribution. Using techniques of multispectral masking and extensive fieldwork, three native vegetation communities were defined and mapped in the Avra Valley study area. A map was made of the Yuma area with the aid of ground truth correlations between areas of desert pavement visible on ERTS images and unique vegetation types. With the exception of the Yuma soil-vegetation correlation phenomena, only very gross differentiations of desert vegetation communities can be made from ERTS data. Vegetation communities with obvious vegetation density differences such as saguaro-paloverde, creosote bush, and riparian vegetation can be separated on the Avra Valley imagery while more similar communities such as creosote bush and saltbush could not be differentiated. It is suggested that large differences in vegetation density are needed before the signatures of two different vegetation types can be differentiated on ERTS imagery. This is due to the relatively insignificant contribution of vegetation to the total radiometric signature of a given desert scene. Where more detailed information concerning the vegetation of arid regions is required, large scale imagery is appropriate.

N75-10545*# Dartmouth Coll., Hanover, N.H. Dept. of Geography.
INVESTIGATION OF LAND USE OF NORTHERN MEGALOPOLIS USING ERTS-1 IMAGERY Final Report, Jun. 1972 - Jul. 1973
Robert B. Simpson, David T. Lindgren, David J. Ruml, and William Goldstein Washington NASA Sep. 1974 63 p refs Original contains color illustrations
(Contract NAS5-21749)
(NASA-CR-2459; S13-116) Avail: NTIS HC $4.25 CSCL 08B

Primary objective was to produce a color-coded land use map and digital data base for the northern third of Megalopolis. Secondary objective was to investigate possible applications of ERTS products to land use planning. Many of the materials in this report already have received national, dissemination as a result of unexpected interest in land use surveys from ERTS. Of special historical interest is the first comprehensive urban-type land use map from space imagery, which covered the entire state of Rhode Island and was made from a single image taken on 28 July 1972. Author

N75-10546*# General Electric Co., Philadelphia, Pa. Space Div.
ERTS 1 FLIGHT EVALUATION REPORT, 23 OCTOBER 1973 - 23 JANUARY 1974
26 Feb. 1974 123 p
(Contract NAS5-21808)
(NASA-CR-140712; Doc-74SD4205) Avail: NTIS HC $5.25 CSCL 05A

Detailed analyses are given of flight performance of ERTS-1 systems and subsystems during orbits 6371 to 7651. A.L.

N75-10547*# General Electric Co., Philadelphia, Pa. Space Div.
ERTS 1 FLIGHT EVALUATION REPORT, 23 JANUARY - 23 APRIL 1974
18 May 1974 141 p
(Contract NAS5-21808)
(NASA-CR-140810; DOC-74SD4217) Avail: NTIS HC $5.75 CSCL 05A

Detailed analyses are given of flight performance of ERTS-1 systems and subsystems during orbits 7652 to 8907. A.L.

N75-10548*# General Electric Co., Philadelphia, Pa. Space Div.
ERTS 1 FLIGHT EVALUATION REPORT, JANUARY 23, 1973 TO APRIL 23, 1973
29 May 1973 196 p
(Contract NAS5-21808)
(NASA-CR-140809; Doc-73SD4249) Avail: NTIS HC $7.00 CSCL 22C

Detailed analyses are given of the performance of systems and subsystems on board ERTS-1 during orbits 2600-3810. A.L.

N75-10549*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THIRD EARTH RESOURCES TECHNOLOGY SATELLITE

SYMPOSIUM. VOLUME 2: SUMMARY OF RESULTS
Stanley C. Freden, ed., Enrico P. Mercanti, ed., and David B. Friedman, ed. Washington May 1974 184 p refs Symp. held at Washington, D. C., 10-14 Dec. 1973 Original contains color illustrations
(NASA-SP-356) Avail: NTIS MF $2.25; SOD HC $3.00 CSCL 05B

Summaries are provided of significant results taken from presentations at the symposium along with some typical examples of the applications of ERTS-1 data for solving resources management problems at the national, state, and local levels. For individual titles, see N75-10550 through N75-10561.

N75-10550* Canada Centre for Remote Sensing, Ottawa (Ontario).
THE CANADIAN ERTS PROGRAM
Lawrence W. Morley *In* NASA. Goddard Space Flight Center Third ERTS Symp., Vol. 2 May 1974 p 7-11 (For availability see N75-10549 01-43)
CSCL 05B

Under a four-year collaborative agreement between the United States and Canada, the Canada Centre for Remote Sensing (CCRS) reads out and distributes the ERTS data of Canada. The Canadian receiving station is at Prince Albert, Saskatchewan, and covers most of Canada except for the East Coast. Production statistics on Canadian ERTS imagery, a summary of several cost benefit case histories, and recommendations for the future of the international aspects of ERTS are discussed and evaluated.
Author

N75-10551* Alaska Univ., Fairbanks.
ENVIRONMENTAL SURVEYS IN ALASKA BASED UPON ERTS DATA
John M. Miller *In* NASA. Goddard Space Flight Center Third ERTS Symp., Vol. 2 May 1974 p 12-40 (For availability see N75-10549 01-43)
CSCL 08B

Alaskan applications of ERTS data are summarized. Areas discussed are: (1) land use; (2) archaeology; (3) vegetation mapping; (4) ice reporting and mapping; (5) fermafrost; (6) mineral and oil exploration; (7) geological surveys; (8) seismology; (9) geological faults and structures; (10) hydrology and water resources; (11) glaciology; (12) water circulation in Cook Inlet; and (13) fish and mammal populations.
A.L.

N75-10552* Geological Survey, Atlanta, Ga.
GEOLOGIC EVALUATION AND APPLICATIONS OF ERTS-1 IMAGERY OVER GEORGIA
S. M. Pickering and R. C. Jones *In* NASA. Goddard Space Flight Center Third ERTS Symp., Vol. 2 May 1974 p 41-49 (For availability see N75-10549 01-43)
CSCL 08G

Satellite imagery and other remote sensing tools and techniques have provided a powerful tool to assist geologic research; significantly increased the mapping efficiency of field geologists; shown new lineaments associated with known shear and fault zones; delineated new structural features; provided a tool to reevaluate tectonic history; helped to locate potential ground-water sources and areas of aquifer recharge; defined areas of geologic hazards; shown areas of heavy siltation in major reservoirs; and, by close interval repetition, aided in monitoring surface mine reclamation activities and the environmental protection of the intricate marshland system. The Georgia Geological Survey has been engaged in regional mapping for the new state geologic map. ERTS-1 images enlarged to compatible mapping scales have increased field geologic mapping efficiency by at least 25%. There are a number of areas where data from ERTS-1 imagery has allowed a notably higher level of precision than has been available with any amount of field work on the ground.
Author

N75-10553* Earth Satellite Corp., Washington, D.C.
AN EVALUATION OF THE SUITABILITY OF ERTS DATA FOR THE PURPOSES OF PETROLEUM EXPLORATION
John R. Everett and Gerald Petzel (Eason Oil Co.) *In* NASA. Goddard Space Flight Center Third ERTS Symp., Vol. 2 May 1974 p 50-61 (For availability see N75-10549 01-43)
CSCL 08G

This investigation was undertaken to determine the types and amounts of information valuable to petroleum exploration that are extractable from ERTS data and to determine the cost of obtaining the information from ERTS relative to costs using traditional or conventional means. In particular, it was desirable to evaluate this new petroleum exploration tool in a geologically well-known area in order to assess its potential usefulness in an unknown area. In light of the current energy situation, it is felt that such an evaluation is important in order to best utilize technical efforts with customary exploration tools, by rapidly focusing attention on the most promising areas in order to reduce the time required to go through the exploration cycle and to maximize cost savings. The Anadarko Basin lies in western Oklahoma and the panhandle of Texas (Figure 1). It was chosen as a test site because there is a great deal of published information available on the surface and subsurface geology of the area, there are many known structures that act as traps for hydrocarbons, and it is similar to several other large epicontinental sedimentary basins.
Author

N75-10554* Corps of Engineers, Washington, D.C.
ERTS PROGRAM OF THE US ARMY CORPS OF ENGINEERS
Jack W. Jarman *In* NASA. Goddard Space Flight Center Third ERTS Symp., Vol. 2 May 1974 p 62-75 (For availability see N75-10549 01-43)
CSCL 08E

The Army Corps of Engineers research and development efforts associated with the ERTS Program are confined to applications of investigation, design, construction, operation, and maintenance of water resource projects. Problems investigated covered: (1) resource inventory; (2) environmental impact; (3) pollution monitoring; (4) water circulation; (5) sediment transport; (6) data collection systems; (7) engineering; and (8) model verification. These problem areas were investigated in relation to bays, reservoirs, lakes, rivers, coasts, and regions. ERTS-1 imagery has been extremely valuable in developing techniques and is now being used in everyday applications.
A.L.

N75-10555* National Oceanic and Atmospheric Administration, Washington, D.C.
A REVIEW OF INITIAL INVESTIGATIONS TO UTILIZE ERTS-1 DATA IN DETERMINING THE AVAILABILITY AND DISTRIBUTION OF LIVING MARINE RESOURCES
William H. Stevenson (NOAA, Bay St. Louis, Mo.), Andrew J. Kemmerer, Buddy H. Atwell (NASA. Mississippi Test Facility), and Paul M. Maughan (Earth Satellite Corp.) *In* NASA. Goddard Space Flight Center Third ERTS Symp., Vol. 2 May 1974 p 76-86 refs (For availability see N75-10549 01-43)
CSCL 08A

The National Marine Fisheries Service has been studying the application of aerospace remote sensing to fisheries management and utilization for many years. The 15-month ERTS study began in July 1972 to: (1) determine the reliability of satellite and high altitude sensors to provide oceanographic parameters in coastal waters; (2) demonstrate the use of remotely-sensed oceanographic information to predict the distribution and abundance of adult menhaden; and (3) demonstrate the potential use of satellites for acquiring information for improving the harvest and management of fisheries resources. The study focused on a coastal area in the north-central portion of the Gulf of Mexico, including parts of Alabama, Mississippi, and Louisiana. The test area used in the final analysis was the Mississippi Sound and the area outside the barrier islands to approximately the 18-meter (10-fathom) curve.
Author

N75-10556* Ohio State Univ., Columbus.
AUTOMATED STRIP MINE AND RECLAMATION MAPPING FROM ERTS
Wayne A. Pettyjohn, Robert H. Rogers (Bendix Corp., Ann Arbor, Mich.), and Larry E. Reed (Bendix Corp., Ann Arbor, Mich.) *In* NASA. Goddard Space Flight Center Third ERTS Symp., Vol. 2 May 1974 p 87-101 (For availability see N75-10549 01-43)
CSCL 08I

In response to the urgent need for a faster and more economical means of generating strip mine and reclamation maps, a study was conducted to evaluate the suitability of using ERTS computer compatible tape for automatic mapping. The procedure

uses computer target spectral recognition techniques as a basis for classification. The area encompassed by this investigation includes five counties in eastern Ohio that comprise nearly 7,500 square kilometers (3,000 square miles). The counties have been disrupted by coal mining since the early 1800's, and strip mining has been practiced in all of them. The environmental effects of strip mining are also discussed. A.L.

N75-10557* Environmental Research Inst. of Michigan, Ann Arbor.
UTILITY OF ERTS FOR MONITORING THE BREEDING HABIT OF MIGRATORY WATERFOWL c51
Edgar W. Work, Jr., David S. Gilmer (Northern Prairie Wildlife Res. Center), and A. T. Klett (Northern Prairie Wildlife Res. Center) *In* NASA. Goddard Space Flight Center Third ERTS Symp., Vol. 2 May 1974 p 102-115 refs (For availability see N75-10549 01-43)
CSCL 06C

Waterfowl breeding-ground surveys conducted each year by the Bureau of Sport Fisheries and Wildlife extend over a vast regivn of the United States and Canada. Data from these surveys are used to estimate waterfowl production by means of a mathematical model. Counts of May and July ponds are some the variables used in this model. Annual production estimates are used to predict fall flights of ducks. This information is then used for establishing waterfowl hunting regulations. Work to date indicates that satellite remote sensing techniques hold considerable promise for the accurate and rapid assessment of waterfowl breeding habitat, especially changes in pond numbers and distribution. Development of an operational system utilizing satellite sensors as a primary source of data appears to be a realistic goal for the future. Author

N75-10558* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AGRICULTURE, FORESTRY, RANGE RESOURCES
Robert B. MacDonald *In its* Third ERTS Symp., Vol. 2 May 1974 p 116-125 (For availability see N75-10549 01-43)
CSCL 08F

The necessary elements to perform global inventories of agriculture, forestry, and range resources are being brought together through the use of satellites, sensors, computers, mathematics, and phenomenology. Results of ERTS-1 applications in these areas, as well as soil mapping, are described. A.L.

N75-10559* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
WATER RESOURCES
Vincent V. Salomonson *In its* Third ERTS Symp., Vol. 2 May 1974 p 126-137 (For availability see N75-10549 01-43)
CSCL 08H

ERTS-1 applications in snow and ice monitoring, surface water monitoring, including monitoring of wetland areas and flood inundated area mapping, and also watershed monitoring for runoff prediction are discussed, Results also indicate that geological features can be noted which relate to ground water. ERTS-1 data can be used successfully in operational situations by water resources management agencies. Author

N75-10560* National Aeronautics and Space Administration. Mississippi Test Facility, Bay Saint Louis.
LAND USE ANP MAPPING
Armond T. Joyce *In its* Third ERTS Symp., Vol. 2 May 1974 p 138-146 (For availability see N75-10549 01-43)
CSCL 08B

The ERTS program provides data that can be used to derive information relative to the actual use of the land resource, in a practical and timely manner. ERTS data provide coverage of total land areas, and its repetitive nature enables the detection and monitoring of changes taking place in land use. Generally, the techniques and the procedures used to extract information from ERTS data may be categorized as pertaining to either the interpretations of ERTS imagery or to the use of digital data and computer techniques. Examples are given of the use of ERTS-1 data for land use classification in: (1) New England areas; (2) Chesapeake Bay and Washington, D.C.; (3) Mississippi Gulf Coast; (4) Los Angeles, California; (5) Houston, Texas; and (6) Phoenix, Arizona. Author

N75-10561* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MINERAL RESOURCES, GEOLOGICAL STRUCTURES, AND LANDFORM SURVEYS
Nicholas M. Short *In its* Third ERTS Symp., Vol. 2 May 1974 p 147-167 refs (For availability see N75-10549 01-43)
CSCL 08E

Since March 1973 there has been a shift in ERTS results in geology from the initial show-and-tell stage to a period in which scientific studies predominated, and now to an emphasis on effective applications having economic benefits and clearcut relevance to national needs. Many years will be spent on geological tasks resulting from ERTS alone; reconnaissance mapping in inaccessible regions, map revisions, regional or synoptic analysis of crustal fractures, assessment of dynamic surficial processes, systematic search for mineral wealth, use of sophisticated enhancement techniques, recognition of potential geologic hazards, and many more applications that still need to be defined. Author

N75-10562*# Bureau of Mines, Twin Cities, Minn. Mining Research Center.
THERMAL DIFFUSIVITY OF SIX IGNEOUS ROCKS AT ELEVATED TEMPERATURES AND REDUCED PRESSURES
D. P. Lindroth 1974 37 p refs
(NASA Order R-09-040-001)
(NASA-CR-140577; BM-RI-7954) Avail: NTIS HC $3.75 CSCL 08G

The thermal diffusivity above 298 K, up to 400 K and at pressures from ambient down to 10 to the minus 10 the power torr was measured for the following six igneous rock types: tholeiitic basalt, obsidian, rhyolite, granodiorite, gabbro, and dunite. Thermal diffusivity data were obtained by the laser flash method. Extreme values range from a low of 5.3x0.001 sq cm/sec for rhyolite at 383 K and 2x10 to the minus 7th power torr to a high of 13.4x0.001 sq cm/sec for dunite at 298 K and 760 torr. Data are also included on a commercial fused silica, which was used as a standard. Author

N75-10563*# Texas A&M Univ., College Station. Remote Sensing Center.
A STUDY OF A DUAL POLARIZATION LASER BACKSCATTER SYSTEM FOR REMOTE IDENTIFICATION AND MEASUREMENT OF WATER POLLUTION
Thomas Carlyle Sheives May 1974 148 p refs
(Grant NGL-44-001-001; Contract DOT-CG-34017-A)
(NASA-CR-140665; RSC-53) Avail: NTIS HC $5.75 CSCL 17I

Remote identification and measurement of subsurface water turbidity and oil on water was accomplished with analytical models which describe the backscatter from smooth surface turbid water, including single scatter and multiple scatter effects. Lidar measurements from natural waterways are also presented and compared with ground observations of several physical water quality parameters. Author

N75-10564*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
THE APPLICATION OF REMOTE SENSING TECHNIQUES: TECHNICAL AND METHODOLOGICAL ISSUES
Fabian C. Polcyn and Thomas W. Wagner Oct. 1974 72 p refs Supported in part by NASA
(Grant NSF GI-34809X1)
(NASA-CR-140674; ERIM-193500-5-X) Avail: NTIS HC $4.25 CSCL 14B

Capabilities and limitations of modern imaging electromagnetic sensor systems are outlined, and the products of such systems are compared with those of the traditional aerial photographic system. Focus is given to the interface between the rapidly developing remote sensing technology and the information needs of operational agencies, and communication gaps are shown to retard early adoption of the technology by these agencies. An assessment is made of the current status of imaging remote sensors and their potential for the future. Public sources of remote sensor data and several cost comparisons are included. Author

N75-10565*# Kanner (Leo) Associates, Redwood City, Calif.
GEOCHEMICAL ACTIVITY OF SOIL MICROORGANISMS AS AN INTEGRAL PART OF BIOGEOCENOSIS
T. V. Aristovskaya Washington NASA Oct. 1974 26 p refs Transl. into ENGLISH from the book "Problemy Biogeotsenologii" Moscow, Nauka Press, 1973 p 11-23
(Contract NASw-2481)
(NASA-TT-F-15976) Avail: NTIS HC $3.75 CSCL 06M

A review, with 30 references, discussing clay minerals and organic matter decomposition and transformation by soil microorganisms were presented. The effect of hydrothermal and other factors on this microbial activity, and the effect of microbial activity on chemical processes in soil and on soil formation was included. Author

N75-10566*# Virginia Inst. of Marine Science, Gloucester Point.
REMOTE SENSING APPLICATIONS IN MARINE SCIENCE PROGRAMS AT VIMS
Hayden H. Gordon, Michael E. Penney, and Robert J. Byrne [1974] 86 p refs
(Contract NAS6-1902)
(NASA-CR-137475) Avail: NTIS HC $4.75 CSCL 14B

Scientists at the Virginia Institute of Marine Science (VIMS) utilized remote sensing in three programs: (1) tonal variations in imagery of wetlands; (2) use of the thermal infrared to delineate the discharge cooling water at the Virginia Electric and Power Company (VEPCO) nuclear power station on the James River; and (3) the use of aerial photography to determine the volume storage function for water in the marsh-bay complex fed by Wachapreague Inlet on the Eastern Shore of Virginia. Details of the investigations are given, along with significant results.
Author

N75-10567*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GEODETIC RESULTS FROM ISAGEX DATA
J. G. Marsh, B. C. Douglas (Wolf R and D Corp., Riverdale, Md.), and D. M. Walls (Wolf R and D Corp., Riverdale, Md.) Aug. 1974 22 p refs Submitted for publication
(NASA-TM-X-70763; X-921-74-250) Avail: NTIS HC $3.25 CSCL 08E

Laser and camera data taken during the International Satellite Geodesy Experiment (ISAGEX) were used in dynamical solutions to obtain center-of-mass coordinates for the Astro-Soviet camera sites at Helwan, Egypt, and Oulan Bator, Mongolia, as well as the East European camera sites at Potsdam, German Democratic Republic, and Ondrejov, Czechoslovakia. The results are accurate to about 20m in each coordinate. The orbit of PEOLE (i = 15) was also determined from ISAGEX data. Mean Kepler elements suitable for geodynamic investigations are presented. Author

N75-10568*# General Electric Co., Philadelphia, Pa. Space Div.
ERTS 1 FLIGHT EVALUATION REPORT, 23 APRIL 1974-23 JULY 1974
15 Aug. 1974 219 p
(Contract NAS5-21808)
(NASA-CR-140711; Doc-74SD4236) Avail: NTIS HC $7.25 CSCL 05A

Detailed analyses are given of flight performance of ERTS-1 systems and subsystems during orbits 8908 to 10182. A.L.

N75-10569*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
S-193 SCATTEROMETER TRANSFER FUNCTION ANALYSIS FOR DATA PROCESSING
Leland Johnson Jul. 1974 19 p refs
(Contract NAS9-13347)
(NASA-CR-140314; CRES-TR-236-2) Avail: NTIS HC $3.25 CSCL 14B

A mathematical model for converting raw data measurements of the S-193 scatterometer into processed values of radar scattering coefficient is presented. The argument is based on an approximation derived from the Radar Equation and actual operating principles of the S-193 Scatterometer hardware. Possible error sources are inaccuracies in transmitted wavelength, range, antenna illumination integrals, and the instrument itself. The dominant source of error in the calculation of scattering coefficent is accuracy of the range. All other factors with the possible exception of illumination integral are not considered to cause significant error in the calculation of scattering coefficient. Author

N75-10570*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
JSC EARTH RESOURCES DATA ANALYSIS CAPABILITIES AVAILABLE TO EOD REVISION B
Jun. 1974 55 p Prepared by Lockheed Electron. Co.
(Contract NAS9-12200)
(NASA-TM-X-72029; LEC-3949) Avail: NTIS HC $4.25 CSCL 05B

A list and summary description of all Johnson Space Center electronic laboratory and photographic laboratory capabilities available to earth resources division personnel for processing earth resources data are provided. The electronic capabilities pertain to those facilities and systems that use electronic and/or photographic products as output. The photographic capabilities pertain to equipment that uses photographic images as input and electronic and/or table summarizes processing steps. A general hardware description is presented for each of the data processing systems, and the titles of computer programs are used to identify the capabilities and data flow. Author

N75-10571*# Chesapeake Research Consortium, Inc., Baltimore, Md.
A SURVEY FOR THE USE OF REMOTE SENSING IN THE CHESAPEAKE BAY REGION
Robert E. Ulanowicz (Maryland Univ.) Jun. 1974 93 p
(Contract NAS6-2433)
(NASA-CR-137476; CRC-Publ-6) Avail: NTIS HC $4.75 CSCL 08B

Environmental problem areas concerning the Chesapeake Bay region are reviewed along with ongoing remote sensing programs pertaining to these problems, and recommendations are presented to help fill lacunae in present research and to utilize the remote sensing capabilities of NASA to their fullest. A list of interested organizations and individuals is presented for each category. The development of technologies to monitor dissolved nutrients in bay waters, the initiation of a census of the disappearing rooted acquatic plants in the littoral zones, and the mapping of natural building constraints in the growth regions of the states of Maryland and Virginia are among the recommendations presented. Author

N75-10572*# Miami Univ., Coral Gables, Fla. Clean Energy Research Inst.
APPLICATION OF REMOTE SENSING FOR PREDICTION AND DETECTION OF THERMAL POLLUTION
T. Nejat Veziroglu and Samuel S. Lee Oct. 1974 100 p refs
(Contract NAS10-8498)
(NASA-CR-139182) Avail: NTIS HC $4.75 CSCL 13B

The first phase is described of a three year project for the development of a mathematical model for predicting thermal pollution by use of remote sensing measurements. A rigid-lid model was developed, and results were obtained for different wind conditions at Biscayne Bay in South Florida. The design of the measurement system was completed, and instruments needed for the first stage of experiment were acquired, tested, and calibrated. A preliminary research flight was conducted.
Author

N75-10573# Physics Lab. RVO-TNO, The Hague (Netherlands).
PATTERN RECOGNITION RELEVANT TO RECONNAISSANCE AND REMOTE SENSING
W. J. P. A. Verbeek Aug. 1974 48 p refs
(PhL-1974-23; TDCK-65200) Avail: NTIS

An introduction to the nature of problem statements and solution techniques, especially concerning problems in automated aerial reconnaissance and remote sensing is presented. Stimulation of the awareness that classification and decision making involve more than intuition and that the literature offers an abundance of ready solutions in this field is proposed. ESRO

N75-10574# Army Foreign Science and Technology Center, Charlottesville, Va.
COMPARISON OF VARIOUS METHODS OF FLIGHT-LINE THREE-DIMENSIONAL ANALYTIC PHOTOTRIANGULATION

I. T. Antipov 12 Apr. 1974 22 p Transl. into ENGLISH from Geod. Kartografiya (USSR), no. 10, 1972 p 37-48
(AD-783662; FSTC-HT-23-174-74) Avail: NTIS CSCL 08/5

Proposed analytic methods of flight-line phototriangulation are systematized and their results in identical conditions are compared. The element of leveling is used to distinguish analytic methods of three-dimensional phototriangulation: either tie-ins of projected rays, or a ground model. GRA

N75-10575# Bureau of Mines, Twin Cities, Minn. Mining Research Center.
DIELECTRIC CONSTANTS AND DISSIPATION FACTORS OF SIMULATED LUNAR ROCKS Report of Investigations
Russel E. Griffin Jun. 1974 25 p refs
(PB-234053/7; BM-RI-7915) Avail: NTIS HC $3.00 CSCL 08G

Dielectric constants and dissipation factors were measured for thirteen simulated lunar rocks over the 20- to 100-megahertz, frequency range by means of the susceptance variation method. Measurements were made at room temperature and normal atmospheric pressure. Results are present and some comparison is made with data reported by others. The rocks used include a broad range of physical characteristics and chemical compositions from the large areas of volcanism in Oregon and Northern California, and two non-volcanic types. These rocks make up a suite of rock standards used by a group of laboratories engaged in lunar research. GRA

N75-10576# Army Foreign Science and Technology Center, Charlottesville, Va.
STUDIES IN STEREOPHOTOGRAMMETRY
F. V. Drobyshev 18 Mar. 1974 185 p refs Transl. into ENGLISH of the book "Issledovaniya v Stereofotogrammetrii" Moscow, 1972
(AD-784425; FSTC-HT-23-0326-73) Avail: NTIS CSCL 08/2

The first part of the work examines the theory and arrangement of stereophotogrammetric instruments, the author's stereographs, including the widely used SD-3 stereograph. It also gives a description of the optical systems and the coordinate counters of the instruments. It examines, in passing, the designs of stereophotogrammetric instruments which are new in principle, such as the planograph, as well as the corrections in the stereograph. The second part analyzes problems of orthotransformation and describes photostereographs, photographic attachments for stereographs, and the OFTD orthotransformer. The third part examines attachments for stereographs for the purpose of obtaining profiling programs for working on an orthotransformer. GRA

N75-10577# Mathematical Applications Group, Inc., Elmsford, N.Y.
AN EXTENSION OF THE COMBINATORIAL GEOMETRY TECHNIQUE FOR MODELING VEGETATION AND TERRAIN FEATURES Final Contract Report
Joan Brooks, Ragini S. Murarka, Daniel Onuoha, Frank H. Rahn, and Herbert A. Steinberg Jun. 1974 52 p refs
(Contract DAAD05-73-C-0537; DA Proj. 1G6-62708-D-05)
(AD-782883; BRL-CR-159) Avail: NTIS CSCL 08/2

An extended version of the MAGI (Mathematical Applications Group, Inc.) Combinatorial Geometry technique has been developed which is capable of realistic modeling of trees and bushes. The method has been demonstrated photographically using the SYNTHAVISION process developed by MAGI. Although the basic modeling techniques are those of the standard Combinatorial Geometry method, major extensions have been introduced to reduce the strains on computer memory and computer time that are inherent in a complex description. The method will eventually be capable of integrating the tree and bush model with models of terrain features, camouflage nets and BRL-COMGEOM descriptions of vehicles. These features of the program are in progress but not yet complete.

Author (GRA)

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N75-10578+ Atomic Energy Commission, Washington, D.C. Technical Information Center.
COAL PROCESSING: GASIFICATION, LIQUEFACTION, DESULFURIZATION: A BIBLIOGRAPHY, 1930 - 1974
Oct. 1974 765 p refs
(TID-3349) Avail: NTIS HC $17.25

The bibliography provides a comprehensive listing of topical materials concerning the several coal processing techniques, including carbonization, desulfurization and purification, hydrogenation, gasification, liquefaction, pyrolysis and cracking, and solvent extraction. Properties of processed coal, coal by-products, and problems in waste management are also covered by the listing. A.A.D.

N75-10579# Bureau of Mines, Morgantown, W.Va. Mineral Resources and Environmental Development.
AN ECONOMIC ANALYSIS OF OIL SHALE OPERATIONS FEATURING GAS COMBUSTION RETORTING Technical Progress Report
Sidney Katell and Paul Wellman Sep. 1974 21 p
(BM-TPR-81) Avail: NTIS HC $3.25

The economics of producing a high quality, semirefined shale oil (Syncrude) from oil shale are discussed. There were two options considered for Syncrude production; 50,000 and 100,000 barrels per calendar day, with an integrated system of underground mining, aboveground processing, and waste handling. The 50,000-barrel-per-day complex will require a capital investment of $279,450,100 (excluding land cost) and will provide a discounted cash flow (DCF) rate of 12% at a Syncrude selling price of $5.66 per barrel. The larger complex will require a capital investment of $522,375,400, but the Syncrude selling price declines to $5.15 per barrel to yield the 12 percent DCF.

Author

N75-10580# Committee on Science and Astronautics (U. S. House).
RESEARCH, DEVELOPMENT, AND THE ENERGY CRISIS
Washington GPO 1974 210 p ref Hearing before Subcomm. on Energy of Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., No. 22, 20 Nov. 1973
(GPO-27-032) Avail: Subcomm. on Energy

Congressional hearings are presented on a bill to provide for early commercial demonstration of technology for solar heating and combined solar heating and cooling by NASA in cooperation with the National Bureau of Standards, the National Science Foundation, the Secretary of Housing and Urban Development, and other Federal agencies. Preliminary results of an ongoing study of energy usage in public and commercial buildings are also discussed. The effects of building location, design, and operation alternatives are considered, together with initial estimates of the conservation potential in the sector. J.A.M.

N75-10581# Committee on Interstate and Foreign Commerce (U. S. House).
INPEPENDENT TRUCKERS AND THE ENERGY CRISIS
Washington GPO 1974 111 p refs Hearings on H.J. Res. 893 before Comm. on Interstate and Foreign Commerce and Subcomm. on Transportation and Aeron., 93d Congr., 2d Sess., 30 Jan. - 6 Feb. 1974
(GPO-31-412) Avail: Subcomm. on Transportation and Aeron.

The Interstate Commerce Commission and the Department of Transportation appeared before the House Subcommittee on Transportation and Aeronautics to make available data on what their respective agencies are doing in regard to the independent truckers and the trucking industry as a whole. The effects of

the energy crisis on the independent truckers is examined, as well as possible solutions to their problems. J.A.M.

N75-10582# Bureau of Mines, Dallas, Tex. Mineral Supply Office.
PROFITABILITY ANALYSIS OF PRODUCING CRUDE OIL BY WATERFLOODING USING A SIMULATION TECHNIQUE
W. D. Dietzman and J. H. Martin 1974 85 p refs
(BM-IC-8652) Avail: NTIS HC $4.75

A profitability analysis of producing crude oil by waterflooding is reported. Included are the estimated costs of installation of water injection and producing equipment for waterfloods at 2,000 and 4,00 feet and the estimated annual operational expenses. Using these cost estimates as a base for selecting a range of costs that are indicative of producing crude oil by waterflooding, a simulation technique was derived for determining the profitability under various conditions. Because of the large number of combinations of variables used in this study, a high-speed digital computer was utilized for the calculations. The variables include operational expenses, capitalized costs, price of the oil, annual production, and leasehold acquisition cost. In addition, a nomographical approach was chosen for presentation of the profitability. Author

N75-10583*# Naval Ammunition Depot, Crane, Ind. Weapons Quality Engineering Center.
EVALUATION PROGRAM FOR SECONDARY SPACECRAFT CELLS: INITIAL EVALUATION TESTS OF GENERAL ELECTRIC COMPANY 12.0 AMPERE-HOUR, NICKEL-CADMIUM SPACECRAFT CELLS FOR THE INTERNATIONAL ULTRAVIOLET EXPLORER SATELLITE
J. D. Harkness 1 Oct. 1974 29 p
(NASA Order S-23404-G)
(NASA-CR-140672; WQEC/C-74-511) Avail: NTIS HC $3.75 CSCL 10A

Evaluation tests are reported for 20 cells to be put into the life cycle program. Leak, capacity, internal resistance, internal short, and overcharge tests are described. F.O.S.

N75-10584*# Auburn Univ., Ala. School of Engineering.
MEGASTAR: THE MEANING OF ENERGY GROWTH: AN ASSESSMENT OF SYSTEMS, TECHNOLOGIES, AND REQUIREMENTS Executive Summary
Sep. 1974 42 p refs
(Grant NGT-01-003-044)
(NASA-CR-120355) Avail: NTIS HC $3.75 CSCL 10A

A methodology for the display and analysis of postulated energy futures for the United States is presented. A systems approach that includes the methodology of technology assessment is used to examine three energy scenarios--the Westinghouse Nuclear Electric Economy, the Ford Technical Fix Base Case and a MEGASTAR generated Alternate to the Ford Technical Fix Base Case. The three scenarios represent different paths of energy consumption for the present to the year 2000. Associated with these paths are various mixes of fuels, conversion, distribution, conservation and end-use technologies. MEGASTAR presents the estimated times and unit requirements to supply the fuels, conversion and distribution systems for the postulated end uses for the three scenarios and then estimates the aggregate manpower, materials, and capital requirements needed to develop the energy system described by the particular scenario. The total requirements and the energy subsystems for each scenario are assessed for their primary impacts in the areas of society, the environment, technology and the economy. Author

N75-10585*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SOLAR ENERGY ABSORBER Patent Application
Lott W. Brantley, Jr., inventor (to NASA) Filed 29 Oct. 1974 15 p
(NASA-Case-MFS-22743-1; US-Patent-Appl-SN-518684) Avail: NTIS HC $3.25 CSCL 10A

A solar energy absorber, including a tubular absorber surface through which a fluid passes for transferring thermal energy layer is vacuum or air for minimizing thermal energy losses through convection. A clear liquid passes between two intermediate layers of glass for transferring, by means of conduction, the thermal energy absorbed by either the initial passage of the visible spectrum of electromagnetic rays or by infrared radiation radiated from an absorber positioned below. Author

N75-10586*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SOLAR ENERGY TRAP Patent Application
Lott W. Brantley, Jr., inventor (to NASA) Filed 29 Oct. 1974 16 p
(NASA-Case-MFS-22744-1; US-Patent-Appl-SN-518544) Avail: NTIS HC $3.25 CSCL 10A

An apparatus is provided for trapping solar energy emitted from the sun for heating a fluid that could be subsequently used in turbines and the like. The apparatus includes an elongated vertical light pipe having an open end through which the visible spectrum of electromagnetic radiation from the sun passes to strike a tubular absorber carried adjacent the other end. The light pipe has a coated interior surface of a low absorptivity and a high reflectivity at the visible wave lengths and a high absorptivity/emissivity ratio at infrared wave lengths. The tubular absorber has a coating on the surface for absorbing visible wave lengths so as to heat the fluid passing through. Infrared wave lengths are radiated from the tubular absorber back into the light pipe for heating fluid passing through a tubular coil wound thereon. NASA

N75-10587*# Kanner (Leo) Associates, Redwood City, Calif.
THE ECONOMICS OF USING WIND POWER FOR ELECTRICITY SUPPLY IN THE NETHERLANDS AND FOR WATER SUPPLY ON CURACAO
H. Vermeulen Washington NASA Oct. 1974 64 p ref Transl. into ENGLISH from the Netherlands reports/TW-555 and GCV-R-128
(Contract NASw-2481)
(NASA-TT-F-15982; TW-555; GCV-R-128) Avail: NTIS HC $4.25 CSCL 10A

It is shown to be economically feasible to harness the wind for electricity supply in the Netherlands in terms of power and production costs. Different wind power plants are discussed in detail. An abridged account of a Danish proposal to harness wind power, and calculation of the efficiency Danish aeromotor are included. Comparisons are made with the power need situation in Curacao, and it is determined that a similar wind power conversion capability recommended for the Netherlands is feasible for the West Indies as well. Author

N75-10588# Committee on Interior and Insular Affairs (U. S. Senate).
ECONOMIC IMPACT OF THE OIL SHALE INDUSTRY IN WESTERN COLORADO
Washington GPO 1974 226 p refs Hearing before Subcomm. on Public Lands of Comm. on Interior and Insular Affairs, 93d Congr., 2d Sess., 19 Jan. 1974
(GPO-28-608) Avail: Subcomm. on Public Lands

The economic impact of leasing public lands for development of the oil shale industry in western Colorado was discussed before the Senate Subcommittee on Public Lands. E.H.W.

N75-10589# Sandia Corp., Albuquerque, N.Mex.
RESULTS OF THERMAL BATTERY CELL TESTING
D. M. Bush 1973 11 p refs Presented at the 26th Power Sources Symp., Atlantic City, 29 Apr. 1974 Sponsored by AEC
(SLA-74-5002; Conf-740407-2) Avail: NTIS HC $3.25

A single cell tester has been described that eliminates some of the variables normally present during the discharge of thermal batteries. A series of tests at different constant temperatures revealed a significant discontinuity in activated life that had not been detected from battery discharge date. The tester has also been used to investigate lot-to-lot variations of DEB powder, variations in DEB processing and composition, and the effect of

N75-10590# Sandia Corp., Albuquerque, N.Mex.
LONG-LIFE, LOW-VOLTAGE, POWER THERMAL BATTERY
A. R. Baldwin 1973 19 p refs Presented at 26th Power Sources Symp., Atlantic City, 29 Apr. 1974 Sponsored by AEC (SLA-73-7069; Conf-740407-1) Avail: NTIS HC $3.25

Battery design, special design considerations, battery performance, and some extended development results are described for the electrically activated, reserve thermal battery that provides 4.5 amperes at 28 volts and has an average activated life of 15 minutes measured to a 25 volt cutoff over an operating temperature range of 0 C to 40 C. Author

N75-10591# Mound Lab., Miamisburg, Ohio.
ADVANCED HEAT SOURCE CONCEPTS
J. E. Selle 10 Apr. 1974 8 p ref
(Contract AT-33-1-GEN-53)
(MLM-2134) Avail: NTIS HC $3.25

Recent trends in heat source programs indicate the feasibility of a modular approach to heat source design. In this approach, modules, comprised of a number of individually encapsulated units or capsulettes, are stacked together to form one heat source. Each capsulette can independently survive impact and post-impact containment. Such heat sources are useful for electrical power generation in space. Author (NSA)

N75-10592# Oak Ridge National Lab., Tenn.
NSF-RANN ENERGY ABSTRACTS: A MONTHLY ABSTRACT JOURNAL OF ENERGY RESEARCH
M. P. Guthrie Jan. 1974 45 p refs
(Contract W-7405-eng-26)
(ORNL-EIS-74-52-Vol-2-No-1) Avail: NTIS HC $3.75

The bibliography contains ninety-three research citations from technical journal articles, popular or semi-technical magazine articles, topical reports, symposium papers and proceedings, monographs, and books published within the past two years. Citations are grouped by subject category headings of energy, energy sources, unconventional energy sources and power generation, electric power, electric power generation, electric power transmission and distribution, energy storage, and energy demand and consumption. NSA

N75-10593# California Univ., Livermore. Lawrence Livermore Lab.
US ENERGY FLOW CHARTS FOR 1950, 1960, 1970, 1980, 1985, AND 1990
A. L. Austin and S. D. Winter 16 Nov. 1973 18 p refs
(Contract W-7405-eng-48)
(UCRL-51487) Avail: NTIS HC $3.25

Energy flow charts for the U.S., showing the origin and disposition of energy for the years 1950,1960,1970,1980,1985, and 1990, are presented along with a piscussion of their development and the implications of the data they represent. An appendix describes the construction of one chart in detail, serving as an example of the method. Author (NSA)

N75-10594# California Univ., Livermore. Lawrence Livermore Lab.
RATIONALE FOR SETTING PRIORITIES FOR NEW ENERGY TECHNOLOGY RESEARCH AND DEVELOPMENT
B. Rubin, S. Winter, W. Ramsey, and G. Werth 4 Jan. 1974 60 p refs
(Contract W-7405-Eng-48)
(UCRL-51511) Avail: NTIS HC $4.25

A strategy for employing new technologies to meet United States energy shortages by 1985, including a set of ground rules for choosing among different technologies, is presented. Twenty-five technology areas are indicated, each of which meets the ground rules and is potentially capable of providing at least 0.5 x 10 to the 15th power Btu/yr by 1985. Source energy prices and 1985 energy production quantities are estimated. Total R and D costs are estimated to be $5.7 billion; total production plant capital costs would be about $73 billion. Relative values of different technologies are compared on the basis of city-gate energy prices. Development of these technologies would approximately double the commercially-available fossil fuel reserves, assuming an energy price increase (in 1973 dollars) of about 30% over 1973 prices. Nonfossil reserves also would be greatly increased. Addition of the energy supplies produced by these new technologies to the supplies derived through conventional means could lead to self-sufficiency in energy by the mid-1980's. Author (NSA)

N75-10595# Atomic Energy Commission, Washington, D.C.
ENERGY TRANSPORTATION, DISTRIBUTION, AND STORAGE Subpanel Report 4 used in preparing the AEC Chairman's Report to the President
1973 158 p refs
(WASH-1281-4) Avail: NTIS HC $6.25

Five year R and D program objectives in transportation and distribution are: (1) continue development of increased-capacity ac and dc overhead power transmission systems by doubling the present capacity by 1985, and achieving a multiplication of 4 to 10 times by the year 2000; (2) to continue the development of reliable and low-cost underground transmission systems capable of matching future overhead systems in both power capacity and voltage; (3) to develop advanced methods and equipment for systems security and control that will improve reliability and efficiency of generation, transmission, and distribution; and (4) to analyze electrical energy transportation systems development in order to identify the more desirable growth options, and to pursue fundamental investigations that have potential for long-term (beyond 2000 AD) applicativn. Five-year objectives in the area of energy storage are given. Author (NSA)

N75-10596# Compagnia Generale di Elettricita S.p.A., Milan (Italy).
TESTING OF NiCd CELLS OVER GEOSTATIONARY ORBIT TYPE CYCLING PERIOD
14 Jan. 1974 78 p
(Contract ESTEC-1185/70-HP)
(ESRO-CR(P)-504) Avail: NTIS HC $4.75

The best charge current of Ni/Cd batteries at a given temperature and a given depth of discharge (d.o.d.) was determined. This was achieved by testing a number of cells under continuous cycling of 24 hours (22.8 hours charge and 1.2. hour discharge). A comparison was also made between the cycling routine with variable charge/discharge time for those depths of discharge averaged on the eclipse duration and the similar rate of charge. The test was performed on 180 sealed cells. The test program demonstrated that temperature is the most important factor affecting cell behavior. Cell operation is good at minus 10 C and + 10 C at any d.o.d. considered, while at + 30 C operation is generally bad. With a few exceptions, cells undergoing the cycling still work after about 440 cycles. ESRO

N75-10597# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DEVELOPMENT OF SOLAR ENGINEERING IN THE USSR
U. A. Arifov 29 Jul. 1974 15 p Transl. into ENGLISH from Geliotekh. (USSR), no. 6, 1972 p 3-8
(AD-784708; FTD-HT-23-792-74) Avail: NTIS CSCL 10/1

The research in problems of solar engineering in the U.S.S.R. is briefly surveyed. F.O.S.

N75-10598# Army Foreign Science and Technology Center, Charlottesville, Va. Transl. into ENGLISH from Mekh. Elek. (USSR), no. 7, 1971 p 43-44
STANDARDIZED WIND ELECTRIC POWER UNIT
V. Fedotov and V. P. Kharitonov 9 May 1974 6 p refs
(AD-783764; FSTC-HT-23-1824-73) Avail: NTIS CSCL 10/2

The standardized UVEU- (1-4) . 6 wind electric power unit is discussed. The unit is suitable for operation at small sites which are distant from power networks and do not have a high power demand. Output and engineering characteristics of the unit are given. GRA

N75-10599# Bureau of Mines, Laramie, Wyo. Energy Research Center.
PRELIMINARY EVALUATION OF UNDERGROUND COAL GASIFICATION AT HANNA, WYOMING
G. G. Campbell, C. F. Brandenburg, and R. M. Boyd Oct. 1974 17 p
(BM-TPR-82) Avail: NTIS HC $3.25

A field test of underground coal gasification was conducted to investigate the technological feasibility of gasifying a sub-

bituminous coal; preliminary results of the experiment are described. The coal was ignited in the central well of a 16-well pattern. Both forward and reverse combustion techniques were attempted to prepare a path of sufficient permeability to permit the high air injection rates necessary for gasification. Gasification between linked wellbores was sustained for periods as long as 3 months. Hydrogen-rich gas havig a heating value of 100 to 150 Btu/scf was produced. Author

N75-10600# Michigan Univ., Ann Arbor.
EVALUATION OF COAL CONVERSION PROCESSES TO PROVIDE CLEAN FUELS, PART 1 Final Report, Nov. 1973 - Feb. 1974
Donald L. Katz, Dale E. Briggs, Edward R. Lady, John E. Powers, and M. Rasin Tek Feb. 1974 78 p refs Sponsored by Electric Power Research Inst., Palo Alto, Calif.
(PB-234202/0; EPRI-206-0-0-1) Avail: NTIS HC $4.00 CSCL 21D

The ongoing research and development programs are reported on coal conversion to clean fuels and coal utilization in environmentally acceptable ways for electric power generation. Part 1 contains the choices and recommendations for research support by EPRI. Those processes which seem to have the best prerequisites for providing clean fuels from coal at the earliest dates are delineated. The bases for the reasoning behind the choices are given. Coal beneficiation, gasification, liquefaction and fluidized bed combustion are compared and evaluated with regard to their potential integration into the electric power industry. GRA

N75-10601# Little (Arthur D.), Inc., Cambridge, Mass.
IMPACT OF MOTOR GASOLINE LEAD ADDITIVE REGULATIONS ON PETROLEUM REFINERIES AND ENERGY RESOURCES, 1974-1980, PHASE 1 Final Report
May 1974 131 p
(Contract EPA-68-02-1332)
(PB-234185/7; EPA-450/3-74-032a) Avail: NTIS HC $4.75 CSCL 13B

The report presents results of a study to assess the impact on operations of petroleum refineries and on energy resources of two regulations promulgated by the Environmental Protection Agency to control the level of lead additive in motor gasoline. The first of these regulations requires the availability of low-octane, lead-free gasoline for vehicles which will be equipped with lead sensitive catalytic converters designed to meet 1975 automotive emission standards. For health reasons, the second regulation requires a gradual phase-down of the lead content of the total gasoline pool (including higher octane gasoline to satisfy the remaining high-compression ratio engines). The study considers separately the impact of each regulation. Effects on overall refinery yields, refinery operation flexibility to maximize production of gasoline and/or heating oils, and on energy resources requirements have been considered. Other parametric studies evaluate suppositions of a need for a higher octane lead free gasoline and a higher demand for lead free gasoline than now forecast. GRA

N75-10602# Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
CONTINUOUS SILICON SOLAR CELLS Quarterly Progress Report, 1 Jan. - 31 Mar. 1974
B. Chalmers, Tj Surek, A. Ij Mlavsky, D. N. Jewett, and J. C. Swartz Apr. 1974 24 p refs Prepared in cooperation with Tyco Labs., Inc., Waltham, Mass.
(Grant NSF GI-37067)
(PB-233949/7; NSF-RA/N-74-038; QPR-1) Avail: NTIS HC $4.25 CSCL 10C

This report summarizes research progress on the application of the (EFG) edge defined film fed growth crystal growth process to the continuous growth of single crystal silicon ribbons from the melt. Analysis of experimental data in conjunction with a macroscopic model of the growth process leads to the conclusion that a detailed study of the microscopic meniscus-interface junction is required for a complete understanding of the growth stability. Die and furnace designs which improve the stability of the EFG process are described. Results of ribbon growth experiments and of solar cell fabrications are presented. GRA

N75-10603# FMC Corp., Princeton, N.J. Chemical Research and Development Center.
CHAR OIL ENDRGY DEVELOPMENT Monthly Reports, Apr. 1968 - Oct. 1969
Jul. 1974 305 p refs
(Contract DI-14-01-0001-498)
(PB-233263/3; MR-19; MR-20; MR-21; MR-22; MR-23; MR-24; MR-25; MR-26; MR-27; MR-28; MR-29; MR-30; MR-31; MR-32; MR-33; MR-34; MR-35; MR-36; MR-37) Avail: NTIS HC $18.25 CSCL 07A

These monthly reports (Apr 68-Oct 69) trace the progress of the development of the COED (charoil-energy-development) process--from bench scale to pilot plant operations at Princeton, New Jersey--by the FMC Corporation under contract (14-01-0001-498) to the Office of Coal Research. Under development since 1962, the COED process converts coal to low-sulfur synthetic crude oil, gas, and char by the fluidized-bed pyrolysis of coal, followed by the hydrotreating of the coal oil to synthetic crude oil. The char can be gasified to give a clean fuel gas for power generation, thus reopening the potential of using high sulfur coals for power generation. Successful operation of a 100 pound-per-hour process development unit led to the design, construction, and operation of a pilot plant at Princeton. The pilot plant can process 36 tons of coal per day and hydrotreat 30 barrels of coal-derived oil daily. GRA

N75-10604# Michigan Univ., Ann Arbor.
EVALUATION OF COAL CONVERSION PROCESSES TO PROVIDE CLEAN FUELS, PART 2 Final Report, Nov. 1973 - Feb. 1974
Donald L. Katz, Dale E. Briggs, Edward R. Lady, John E. Powers, and M. Rasin Tek Feb. 1972 410 p refs Sponsored by Electric Power Research Inst., Palo Alto, Calif.
(PB-234203/8; EPRI-206-0-0-2) Avail: NTIS HC $8.50 CSCL 21D

A review is made of six general methods of coal utilization with elimination of the sulfur prior to or during combustion in an electric power generating plant: fluidized bed combustion, coal beneficiation, pyrolysis, coal gasification, coal dissolution and liquefaction, in-situ combustion. The processes in each category were reviewed, analyzed and evaluated. Critical process steps, where additional research must be done before the processes can be considered at the commercial stage of development, were identified. The advantages and disadvantages of 37 processes were identified. Also included are discussions of combined cycle systems, economics, retrofit capabilities, thermodynamics and coal slurry pipelines. These topics give perspective to the general subject of coal use. (Modified author abstract) GRA

N75-10605# Stanford Research Inst., Menlo Park, Calif.
EFFECTIVE UTILIZATION OF SOLAR ENERGY TO PRODUCE CLEAN FUEL Final Report
John A. Alich, Jr. and Robert E. Inman Jun. 1974 164 p refs
(Grant NSF GI-38723)
(PB-233956/2; NSF-RA/N-74-036) Avail: NTIS HC $5.00 CSCL 21D

The suitability of plant material as an energy feedstock was evaluated. Items covered include: types of vegetation best suited for a solar conversion facility, type and availability of land, logistics and economics of growing the desired crop, energy budget for plant material production and harvesting, and a technoeconomic comparison of firing the crops directly for electric power generation with converting them to clean fuel gas (methane or low-Btu gas) either at the farm site or at selected markets. Research needs in key technical and economic areas are pointed out. Author (GRA)

N75-10606# Army Foreign Science and Technology Center, Charlottesville, Va.
RELIABILITY OF LIQUID-METAL INDUCTION MHD MACHINES
V. V. Abkhazi, A. I. Malykhin, and I. V. Rybin 6 May 1974 147 p refs Transl. into ENGLISH from unidentified RUSSIAN book, Moscow, 1972 104 p
(AD-784208; FSTC-HT-23-0016-74) Avail: NTIS CSCL 10/2

General descriptions of liquid metal induction MHD machines

and their fields of use are given. Theoretical calculations of MHD machine reliability, including apriori estimates of wear reliability and parametric reliability, as well as numerical estimates of MHD generator and electromagnetic pump reliability in the planning stages, are presented and discussed. The book is concluded with general questions on MHD machine reliability, including a possible program of testing reliability, economics, strength, spot tests of elements, accelerated tests and considerable tabular data. GRA

N75-10607# Mallory (P. R.) and Co., Inc., Burlington, Mass. Lab. for Physical Science.
SEALED PRIMARY LITHIUM-INORGANIC ELECTROLYTE CELL Quarterly Report, 1 Mar. - 31 May 1974
A. N. Dey Jul. 1974 53 p refs
(Contract DAAB07-74-C-0109)
(AD-782819; ECOM-74-0109-1; QR-1) Avail: NTIS CSCL 10/3

Compatibility of twenty different metals and alloys with the inorganic electrolyte comprising 1.5(M) LiAlCl4-SOCl2 were determined by refluxing the materials at 85C (185F) for approximately one month. All the materials including Ni, Mo and Ta were found to be compatible except Ni-clad steel. The steel portion was dissolved from the exposed sides of the sample leaving the Ni foil intact. This indicated that completely covered Ni-clad or Ni-plated steel may still be compatible. Of the various insulating materials tested in the above manner, only Teflon, Kel-F and glass were found to be compatible. Optimization of the system was carried out in a factorial experiment. The data showed that cells with 1(M) electrolyte made in our laboratory and with 10% Teflon in the cathode performed the best. Pressure build-up studies were carried out in a modified C cell and it was found that pressure build-up should not pose any significant problem in the cell design. (Modified author abstract) GRA

N75-10608# Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
NOVEL MATERIALS FOR POWER SYSTEMS. PART 3: SELECTIVE EMITTERS FOR ENERGY CONVERSION Annual Technical Report, 1 Jun. 1973 - 31 May 1974
R. J. Schwartz, D. DeWitt, K. Hoilman, L. Tiedeman, and S. Gaalema 15 Jul. 1974 46 p refs
(Grant DAHC15-73-G-0011; ARPA Order 2338)
(AD-784449) Avail: NTIS CSCL 10/2

The purpose of the research was to determine those materials which would be most promising for use as selective emitters, to fabricate initial samples for testing, to build an optical system capable of measuring the spectral efficiency rapidly, and accurately, and to make initial measurements on the spectral efficiency of promising samples. All of these goals have been met. It has been determined that the rare earth oxides and mixtures of rare earth oxides are quite promising as selective emitters for energy conversion. Initial samples of erbium oxide and mixtures of erbium oxide and ytterbium oxide have been fabricated. An optical system for measuring spectral efficiency has been built and preliminary tests run for measuring the spectral efficiency of these materials. The spectral efficiency measurement apparatus incorporates an automatic data acquisition system which allows the rapid processing of large numbers of samples. GRA

N75-10609# Advanced Kinetics, Inc., Costa Mesa, Calif.
CHEMICAL TO ELECTROMAGNETIC ENERGY CONVERSION TECHNIQUES Final Report, May 1972 - Mar. 1974
Ralph W. Waniek Jun. 1974 159 p refs
(Contract F30602-72-C-0401; AF Proj. 4506)
(AD-783901; RADC-TR-74-154) Avail: NTIS CSCL 10/2

The objective of the work was to develop techniques for conversion of the very high density energy stored chemically to pulses of electrical energy. Reliable low cost single shot convertors have been demonstrated by investigators in explosive flux compression technology. The techniques investigated are for use in high power lightweight transmitter experiments in support of TP05. Multiple shot magnetic flux compression concepts were analyzed, experimentally verified, and categorized as to potential device use. The concepts investigated have the capability for multiple pulse operation and all involved the rapid deceleration of either explosively driven shock fronts or explosively driven metallic projectiles in a magnetic field. The effects of physical parameters of the decelerated medium and the magnetic field were experimentally verified and parameter tradeoffs were developed. GRA

N75-10610# Avco-Everett Research Lab., Everett, Mass.
EXPERIMENTAL AND ANALYTICAL RESEARCH ON A TWO MEGAWATT, HIGH PERFORMANCE MHD GENERATOR Interim Technical Report
O. K. Sonju and J. Teno Jun. 1974 99 p refs
(Contract F33615-71-C-1456; AF Proj. 3145)
(AD-783267; AFAPL-TR-74-47-Pt-1; ITR-2) Avail: NTIS CSCL 10/2

The Second Interim Report - Part I presents the further results of a combined analytical and experimental program whose broad objectives are: (1) to achieve a more complete understanding of the operation and appropriate design techniques of compact high performance MHD generators by further establishing the detailed analytical basis of the performance of these generators and (2) to demonstrate the feasibility of operating compact high performance MHD generators under a repetitively pulsed mode of operation at high power levels -- in this case at the 2 MW level. In Interim Report No. 1, the design and fabrication of a 2 MW MHD generator and test facility was discussed. In this report, Interim Report No. 2 - Part I, are presented the results and discussions of tests performed using the 2 MW MHD generator and test facility. (Modified author abstract) GRA

N75-10611# Defence Research Establishment Ottawa (Ontario).
OPERATION OF AIR CATHODES IN THE PRESENCE OF HYDRAZINE
William A. Armstrong Jul. 1974 16 p refs
(AD-783241; DREO-TN-74-13) Avail: NTIS CSCL 10/2

The operational characteristics of air cathodes having either manganese dioxide or silver as the electrocatalyst have been studied in fuel-electrolyte mixtures typical of those encountered in hydrazine/air fuel cells. Manganese dioxide was found to react chemically with hydrazine while silver was found to catalytically decompose hydrazine to gaseous products. In addition the polarization at all electrodes tested was increased by the presence of hydrazine in the electrolyte. Sintered nickel proved to be a more suitable substrate for the electrocatalyst than activated carbon as it was less reactive with hydrazine. A microporous polypropylene separator material was found to greatly reduce the hydrazine concentration at the air cathode and thus decrease the cathode polarization. Author (GRA)

N75-10612# GTE Sylvania, Inc., Waltham, Mass.
SEALED LITHIUM INORGANIC ELECTROLYTE CELL Quarterly Report, 1 Mar. - 31 May 1974
N. Marincic Jul. 1974 27 p ref
(Contract DAAB07-74-C-0108; DA Proj. 1S7-62705-AH-94)
(AD-784072; ECOM-74-0108-1; QR-1) Avail: NTIS CSCL 10/3

The report describes research on a sealed lithium inorganic electrolyte cell. Design specifications and drawings are included. Performance is briefly reported for standard size D cells. GRA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N75-10613 Polytechnic Inst. of Brooklyn, N.Y.
STUDIES OF POLLUTANT CONCENTRATION FREQUENCY DISTRIBUTIONS Ph.D. Thesis
Richard Irwin Pollack 1974 94 p
Avail: Univ. Microfilms Order No. 74-22493

The nature of the frequency distributions is considered for both reactive and inert pollutants, for both point and area sources, and to some extent for different types of atmospheric conditions using a substantially non-empirical approach. It is found that a theory of the genesis of pollutant concentrations based upon the Fickian diffusion equation predicts that concentration distributions due to area sources will be approximately lognormal over a diurnal cycle in the absence of nearby strong sources. It

is determined that reactive pollutants will have larger standard geometric deviations than relatively inert pollutants. Empirical observations are in good agreement with these results. The frequency distribution of the logarithms of concentrations due to point sources is derived and shown to be a sum of normal and chi-squared components, with the identity of the dominant term determined by meteorological conditions. A predictive scheme based upon using concentration frequency distributions as a basis for classifying meteorological patterns is presented.
Dissert. Abstr.

N75-10614 Pittsburgh Univ., Pa.
THREE SUGGESTED METHODS OF CONTROLLING AIR POLLUTION IN THE US AND THEIR PROBABLE ECONOMIC IMPACT ON THE DOMESTIC COAL INDUSTRY Ph.D. Thesis
Paul Henry Mutschler 1973 157 p
Avail: Univ. Microfilms Order No. 74-18416

The probable economic impact on the domestic coal industry is considered of three suggested methods of controlling air pollution, i.e., pre combustion legislation, post combustion legislation, and a tax system. An analysis was made of how each method of air pollution control affected current coal producing areas, the area coal markets, and competitive position with respect to other substitute fuels. It was found in the short run that post combustion legislation and the effluent charge, an optimum combustion, could both be implemented because of their complimentarity in solving the air pollution problem. In the long run post combustion legislation will be less injurious to the coal industry than pre combustion legislation and will be the only method needed to control air pollution. Dissert. Abstr.

N75-10615 Purdue Univ., Lafayette, Ind.
AN AIR POLLUTION CONTROL SYSTEM Ph.D. Thesis
William Arthur Hamlen 1973 307 p
Avail: Univ. Microfilms Order No. 74-15169

This dissertation presents the background and present stage of development of an air pollution control system which is designed to answer basic questions on the control of air pollution when only a limited amount of information is available. An attempt is made to simplify the major physical forces and present them in a concise manner which can be more rapidly understood on a conceptual level by such persons. A limited-information multiple-source urban dgfusion model is developed and tested. The model requires only a few selected parameters which describe the local climatological observations and either an estimate of the total area emission rate or some measured concentration over time. The model was tested for one month of observations in Chicago. Following other such tests on atmospheric diffusion models a correlation coefficient of over .76 between the predicted and observed levels of sulfur dioxide is obtained. This exceeds that obtained with two other published results for Chicago.
Dissert. Abstr.

N75-10616*# Florida Technological Univ., Orlando. Office of Research and Graduate Studies.
ECOLOGICAL EFFECTS AND ENVIRONMENTAL FATE OF SOLID ROCKET EXHAUST Annual Report
Bruce Nimmo, I. Jack Stout, John Mickus, David Vickers, and Brooks Madsen 15 Oct. 1974 105 p refs
(Grant NGR-10-019-009)
(NASA-CR-140598; AR-2) Avail: NTIS HC $5.25 CSCL 13B

Specific target processes were classified as to the chemical, chemical-physical, and biological reactions and toxic effects of solid rocket emissions within selected ecosystems at Kennedy Space Center. Exposure of Citris seedlings, English peas, and bush beans to SRM exhaust under laboratory conditions demonstrated reduced growth rates, but at very high concentrations. Field studies of natural plant populations in three diverse ecosystems failed to reveal any structural damage at the concentration levels tested. Background information on elemental composition of selected woody plants from two terrestrial ecosystems is reported. LD sub 50 for a native mouse (peromysous gossypinus) exposed to SRM exhaust was determined to be 50 ppm/g body weight. Results strongly indicate that other components of the SRM exhaust act synergically to enhance the toxic effects of HCl gas when inhaled. A brief summary is given regarding the work on SRM exhaust and its possible impact on hatchability of incubating bird eggs. Author

N75-10617# Committee on Interior and Insular Affairs (U. S. Senate).
NATIONAL ENVIRONMENTAL POLICY ACT OF 1969. ENVIRONMENTAL INDICES, STATUS OF DEVELOPMENT PURSUANT TO SECTIONS 102(2)(B) AND 204 OF THE ACT
James W. Curlin Washington GPO 1973 54 p refs Presented to Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., Dec. 1973 Prepared by the Library of Congr., Environ. Policy Div.
(GPO-25-314) Avail: SOD HC $0.55

Developments in the design of environmental indices for monitoring the environment are reported. Topics discussed include: indicators and indices, environmental components, obstacles to the development of indices and indicators, air quality index, land use index, and noise pollution index. F.O.S.

N75-10618# Research Triangle Inst., Durham, N.C.
COMPARABILITY OF NINE METHODS FOR MONITORING NO2 IN AMBIENT AIR Final Report
T. D. Hartwell, C. A. Clayton, C. E. Decker, and P. N. Hunt Mar. 1974 273 p refs
(Contract EPA-68-02-0335)
(PB-233429/0; RTI-25U-711-3; EPA-650/4-74-012) Avail: NTIS HC $16.75 CSCL 07B

The present study was undertaken to compare several NO2 monitoring methods based on field data collected by EPA. Three continuous monitors (chemiluminescent and two Saltzmans) and six bubblers (two arsenite, two modifications of the Jacobs Hochheiser, and two triethanolamine methods were investigated. In particular, objectives of the project were: (1) to determine the comparability of these nine methods using field measurements obtained in Chattanooga, Los Angeles, and St. Louis; and (2) to determine, if possible, conversion factors for converting readings from one method to another. The criteria used in attempting to satisfy these objectives involved examining statistics such as correlations between methods, ratios of method means, and regression relationships between pairs of methods. GRA

N75-10619# Environmental Protection Agency, Research Triangle Park, N.C. Div. of Information Services.
AIR POLLUTION TRANSLATIONS: A BIBLIOGRAPHY WITH ABSTRACTS, VOLUME 5
Feb. 1974 109 p refs
(PB-233374/8; EPA-220/2-74-001; EPA-450/1-74-001) Avail: NTIS HC $8.50 CSCL 13B

The entries contained in the compilation on technical air pollution literature are grouped into the following subject categories: (1) emission sources; (2) control methods; (3) measurement methods; (4) air quality measurements; (5) atmospheric interaction; (6) basic science and technology; (7) effects on human health; (8) effects on plants and livestock; (9) effects on materials; (10) economic effects; (11) standards and criteria; (12) legal and administrative aspects; (13) social aspects; and (14) general aspects. A list of additional air pollution topics in journals and monographs is included. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N75-10620 Delaware Univ., Newark.
CANONICAL FORMULATION OF INSTANTANEOUS ELECTRODYNAMICS, GRAVITATION Ph.D. Thesis
Dominique Hirondel 1974 282 p
Avail: Univ. Microfilms Order No. 74-22210

After proving that particle positions cannot be canonical variables, a canonical formulation of instantaneous action-at-a-distance electrodynamics is found to all orders in e sub 1e sub 2; it is formally the same as for free particles. External

and internal motions are separated, and the problems of convergence in e sub 1e sub 2 and of quantization are mentioned. The order reduced accelerations for three charges are found. Causality is discussed in the context of instantaneous electrodynamics. The EIH gravitational accelerations are proved to satisfy Currie Hill conditions. The EIH Lagrangian is recovered from the Schwarzschild metric in harmonic coordinates by a Lorentz transformation. Dissert. Abstr.

N75-10621*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE EVOLUTION OF ELECTRON DENSITY AND TEMPERATURE DISTRIBUTIONS IN THE TOPSIDE IONOSPHERE DURING MAGNETIC STORMS
K. D. Cole and J. A. Findlay Oct. 1974 24 p refs Submitted for publication
(NASA-TM-X-70768; X-621-74-283) Avail: NTIS HC $3.25 CSCL 04A

The latitudinal distributions of electron density and temperature during geomagnetic storms in the mid-latitude topside ionosphere are observed to change in a manner than can be related to the evolution of ring current particle populations. The region of auroral precipitation is characterized by correlated increases in electron temperature and density. Equatorwards of this region, there is a broad belt of elevated electron temperatures and depressed electron densities which is usually much broader than any stable auroral red arc distinguishable from the ground, but which is nevertheless the same basic physical phenomenon. The changes of position of this belt can be related to prior bursts of geomagnetic activity and injection of ring current particles into the magnetosphere. Author

N75-10622*# Scientific Translation Service, Santa Barbara, Calif.
TURBULENCE STUDIES ON A HIGH-ALTITUDE SOUNDING AIRCRAFT
V. D. Litvinova Washington NASA Nov. 1973 11 p ref Transl. into ENGLISH from Tr. Tsentr. Aerolog. Observ. (Moscow), no. 112, 1973 p 86-90
(Contract NASw-2483)
(NASA-TT-F-16003) Avail: NTIS HC $3.25 CSCL 04A

Theoretical and experimental studies were collected of convective processes, turbulence and wave propagation in the atmosphere. The existing hydrodynamic models of cumuli are reviewed. The results of extensive studies of temperature field structures in various portions of cumuli are also included. Other studies concern the theory of atmospheric gravitational waves, and turbulence in the stratosphere as observed in a high-altitude sounding aircraft. Author

N75-10623# Israel Program for Scientific Translations, Ltd., Jerusalem.
STUDIES IN ATMOSPHERIC ELECTRICITY
V. P. Kolokolov, ed. and T. V. Lobodin, ed. 1974 143 p refs Transl. into ENGLISH of the book "Atmosfernoe Elektrichestvo" Leningrad, Gidrometeoizdat, 1972 143 p Supported by the US-Israel Binatl. Sci. Found.
(TT-74-50008) Avail: NTIS HC $5.75 CSCL 04A

The various aspects of cloud physics and electric fields are discussed in relation to thunderstorms, auroras, lightning, and weather modifications. G.G.

N75-10624# Naval Research Lab., Washington, D.C.
PROCEEDINGS OF THE WALDORF CONFERENCE ON LONG RANGE GEOGRAPHIC ESTIMATION OF LIGHTNING SOURCES
R. V. Anderson, R. B. Bent, H. Dolezalek, and F. J. Kelly Jul. 1974 516 p refs Conf. held at Arlington, Va., 11-16 Sep. 1972
(AD-784393; NRL-7763) Avail: NTIS CSCL 04/1

Contents: Review of methods for long-range geographic estimation of lightning sources; The physics of the sferics emitter--lightning; Propagation of sferics over long range; ULF, SLF, and ELF methods for localization of thunderstorms; General results obtained with various systems; Results obtained with the HHI--atmospherics analyzer. GRA

N75-10625# Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Applied Geomechanics.
THE PUCE PROGRAMME FOR TERRAIN EVALUATION FOR ENGINEERING PURPOSES. 2: PROCEDURES FOR TERRAIN CLASSIFICATION
K. Grant 1974 82 p refs
(PB-233847/3; TP-19) Avail: NTIS HC $7.25 CSCL 08F

Principles of terrain evaluation in accordance with the PUCE program for terrain evaluation for engineering purposes are outlined. A complete instruction manual is also provided on the art of terrain class classification conducted in accordance with the standard system incorporated as an integral part of the PUCE program. The manual includes as appendices the definitions of and numerical system for nomenclature of the terrain classes, class intervals for terrain parameters, and the Unified Soil Classification scheme. Also included as appendices are examples of standard terrain class description sheets, a glossary of standard terms to be used in terrain classification, and examples extracted from the complete classification of one area in Australia. Author (GRA)

N75-10626# Naval Research Lab., Washington, D.C.
MAGNETIC VARIATIONS CAUSED BY WIND WAVES Interim Report
John M. Bergin Jul. 1974 28 p refs
(NRL Proj. 83G03-01; RR1310341)
(AD-783944; NRL-MR-2843) Avail: NTIS CSCL 08/14

Due to the high sensitivity of the newer magnetometers, magnetic variations induced by sea waves have become important. Statistical properties of the magnetic variations induced by an arbitrary directional spectrum of wind waves are investigated. Detailed numerical results for the case of the fully developed Neumann directional spectrum are presented in order to convey some idea of the magnitude and nature of magnetic variations in different geographic locations under various wind conditions. GRA

N75-10627# Naval Research Lab., Washington, D.C.
GEOLOGIC AND GEOMAGNETIC BACKGROUND NOISE IN TWO AREAS OF THE NORTH ATLANTIC, PHASE 1 Final Report
Perry B. Alers and John M. Bergin 25 Jul. 1974 25 p refs
(NRL Proj. G03-01; RR1310341)
(AD-783693; NRL-7760) Avail: NTIS CSCL 08/14

Surface magnetic fields were measured in two areas of the North Atlantic Quiet Zone in order to characterize the level of magnetic interference arising from geological features in the sea floor. Several of the New England seamounts were found to be isolated in their magnetic effects; the surrounding magnetic environment was not significantly different from that found elsewhere in the Quiet Zone. In another area, a sufficient number of tracks was followed to reveal the presence of low-amplitude magnetic features in which a N-NE trend can be discerned and whose wavelength, 30-40 km, is comparable to that found in more active areas to the east. A filtering technique used on the data enabled us to separate geologic from geomagnetic noise, and the difference between interference encountered on quiet and noisy days is quantitatively described. (Modified author abstract) GRA

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N75-10628*# Scientific Translation Service, Santa Barbara, Calif.
FINITE-AMPLITUDE WAVES IN A STRATIFIED JET STREAM AND CLEAR AIR TURBULENCE
Z. N. Kogan and N. P. Shakina Washington NASA Oct. 1974 21 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Fiz. Atm. Okeana (Moscow), v. 10, Apr. 1974 p 333-343
(Contract NASw-2483)
(NASA-TT-F-16002) Avail: NTIS HC $3.25 CSCL 04B

The nonlinear problem of stability of internal waves in a stratified jet stream was solved by the amplitude power expansion

method in accordance with the two-time method. The conclusion was reached that in a free atmosphere hydrodynamically unstable layers become turbulent very rapidly; they may practically always be considered to be turbulent layers. It was shown that the layer of the tropopause may be regarded as a particular layer which has the greatest probability of containing zones of secondary instability and turbulent patches, which are formed by internal gravitational shear waves of finite amplitudes. Author

N75-10629# North Central Forest Experiment Station, St. Paul, Minn.
MEAN PRECIPITATION-HOURS FOR THE CONTERMINOUS UNITED STATES
Donald A. Haines 1973 22 p refs
(NC-98) Avail: NTIS HC $3.25

Aspects of precipitation hours per unit time are examined. Presents nationwide patterns of mean precipitation hours per month as well as precipitation hours per precipitation day are considered. Author

N75-10630# Federal Aviation Administration, Washington, D.C.
SERVICE C WEATHER SCHEDULES
1 Jan. 1974 45 p
(FAA-7330.7I) Avail: NTIS HC $3.75

Detailed operating arrangements for the distribution of meteorological information to flight service stations included in the FAA communications system are presented. Author

N75-10631# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CHARACTERISTICS OF FRONTAL CLOUD LAYERS SUITABLE FOR INFLUENCE
N. M. Akimov, B. N. Leskov, and T. D. Nerobeev 11 Jul. 1974 18 p refs Transl. into ENGLISH from Tr. Ukr. Nauch.-Issled. Gidrometeorol. Inst. (USSR), no. 106, 1971 p 49-58
(AD-783977; FTD-HT-23-1175-74) Avail: NTIS CSCL 04/2

Several characteristics useful for modification of frontal cloud layers are examined. GRA

N75-10632# University Corp. for Atmospheric Research, Boulder, Colo. National Center for Atmospheric Research.
[ATMOSPHERIC AND CLIMATOLOGICAL RESEARCH PROGRESS] Annual Report, 1974
Oct. 1974 101 p refs Sponsored by NSF
Avail: NTIS HC $5.25

The Global Atmospheric Research Program, the small-scale analysis and prediction project, the National Hail Research Experiment, the atmospheric aerosol project, the upper atmosphere project, and the high altitude observatory are a few of the research projects described in the annual report. A.A.D.

N75-10633# World Meteorological Organization, Geneva (Switzerland).
INTERNATIONAL OPERATIONS PLAN FOR THE GARP ATLANTIC TROPICAL EXPERIMENT, PARTS 1, 4, 6 AND 7
Feb. 1974 154 p refs
(GATE-9-Pt-1; GATE-9-Pt-4; GATE-9-Pt-6; GATE-9-Pt-7) Avail: NTIS HC $6.25; WMO, Geneva

The general background and objectives of the GARP Atlantic Tropical Experiment which took place between 15 June and 23 September 1974 is presented together with descriptions of the satellite operations plan, the operations support plan and the data coordination plan which form part of the GATE international operations plan. For individual titles, see N75-10634 through N75-10637.

N75-10634 World Meteorological Organization, Geneva (Switzerland).
[GENERAL BACKGROUND AND OBJECTIVES AND REFERENCE INFORMATION ON PLATFORM STATUS, SHIP SCHEDULES AND DISTRIBUTION]
R. F. Long *In its* Intern. Operations Plan for the GARP Atlantic Trop. Expt., Pts. 1, 4, 6 and 7 Feb. 1974 47 p (For availability see N75-10633 01-47)

The GARP Atlantic Tropical Experiment is summarized. Basic objectives and present status, member nations, operational details, ship distribution, experiment schedule, and relationships with national and scientific coordinators are included. ESRO

N75-10635 World Meteorological Organization, Geneva (Switzerland).
SATELLITE OPERATIONS PLAN
D. E. Parker *In its* Intern. Operations Plan for the GARP Atlantic Trop. Expt., Pts. 1, 4, 6 and 7 Feb. 1974 48 p refs (For availability see N75-10633 01-47)

During the GARP Atlantic Tropical Experiment, a number of U.S.A. and U.S.S.R. meteorological satellites will be operating within the GATE area. The GATE plan for the acquisition, processing, displaying, and analyzing of data from these satellites is discussed, and the operational satellite systems are briefly described. ESRO

N75-10636 World Meteorological Organization, Geneva (Switzerland).
OPERATIONS SUPPORT PLAN
R. F. Long *In its* Intern. Operations Plan for the GARP Atlantic Trop. Expt., Pts. 1, 4, 6 and 7 Feb. 1974 33 p (For availability see N75-10633 01-47)

The operations support plan is intended for the personnel involved in the preparation and implementation of GATE. It describes the operational activities of GATE personnel in Dakar during the experimental period in the summer of 1974, together with general information on support. The organizational structure of the GATE operations control centre at Dakar is presented and a description of the functions given. ESRO

N75-10637 World Meteorological Organization, Geneva (Switzerland).
DATA COORDINATION PLAN FOR THE GATE OPERATIONS CONTROL CENTRE (GOCC)
T. DelaMoriniere *In its* Intern. Operations Plan for the GARP Atlantic Trop. Expt., Pts. 1, 4, 6 and 7 Feb. 1974 19 p (For availability see N75-10633 01-47)

The data coordination function in Dakar during the field phase of GATE is presented. The planned information handling for data of Dakar is briefly described, and an estimate of the volume of data available is given. Proposed user products resulting from data coordination activities in Dakar are also mentioned. A schedule of activities is presented. ESRO

N75-10638# California Univ., Livermore. Lawrence Livermore Lab.
COMPARISON OF THE SOUTHERN AND NORTHERN HEMISPHERE GENERAL CIRCULATION CHARACTERISTICS AS DETERMINED BY SATELLITE OZONE DATA
J. E. Lovill Mar. 1974 51 p refs Presented at the 1st Spec. Assembly of the Intern. Assoc. of Meteorol. and Atmospheric Phys., Melbourne, 14-25 Jan. 1974 Sponsored by AEC
(UCRL-75556; Conf-740106-4) Avail: NTIS HC $4.25

Satellite total ozone data were analyzed for the Southern Hemisphere (autumn and winter) and the Northern Hemisphere (spring and summer). A strong correlation was found between global meridional gradients of total ozone and the wind velocity in baroclinic zones. The ozone wave maxima correspond to regions of stratospheric heating. A large region of low total ozone was observed in the four months averages in equatorial regions, extending from Southeast Asia to the central Pacific; a large area of high equatorial ozone occurs from the central Atlantic across Africa. This ozone distribution suggests a large double cell motion near the equator, such that there is a large scale descending motion in the Atlantic and African sectors, as well as a slowly ascending motion in the Southeast Asian and Pacific sectors. A relatively tight ozone gradient was also seen in the Atlantic Ocean between 40 deg N and 50 deg N, a region which corresponds to the high density aircraft flight corridor between the eastern United States and the European region. Author

N75-10639# World Meteorological Organization, Geneva (Switzerland).
MODELLING FOR THE FIRST GARP GLOBAL EXPERIMENT
Jun. 1974 279 p refs Prepared jointly with Intern. Council of Sci. Unions
(GARP-Publ-14) Avail: NTIS HC $8.75; WMO, Geneva

Recent advances made in the construction of models suitable for the study of the general circulation and for extended range

prediction are described. A discussion of the need for the first GARP global experiment in the further development of modelling research is given. Descriptions are presented of nineteen global or hemispheric models. These are partitioned into four groups. ESRO

N75-10640# Royal Netherlands Meteorological Inst., De Bilt.
DOES REPRESENTATIVE GROUND WIND MEASUREMENT EXIST? [BESTAAT REPRESENTATIEVE GRONDWINDMETING?]
J. Wieringa Aug. 1974 37 p refs In DUTCH
(KNMI-V-257) Avail: NTIS HC $3.75

The existing wind measurement network in the Netherlands is evaluated, and the method of data processing is discussed. Data processing is based on the transformation of station measurements to a flat terrain. The basic data for this transformation are: wind direction, mean and maximum wind velocity, and time of day. It is shown that representation wind measurement is not possible in developed parts of the country as it is impossible to conduct wind measurements at any altitude which, without correction, are representative for the WMO wind velocity at 10 m altitude in open country. But it is possible to derive a representative wind velocity from station measurements and mean and maximum wind velocity. The accuracy of the transformation developed for this purpose is discussed. ESRO.

N75-10641# Woods Hole Oceanographic Institution, Mass.
CRUISE DATA REPORT. CHAIN 115 LEG 2, SOUTHLANT EXPEDITION
D. A. Richards, R. C. Groman, and S. R. Gegg Aug. 1974 25 p
(Contract N00014-66-C-0241; NR Proj. 083-004)
(AD-784421; WHOI-74-59) Avail: NTIS CSCL 08/10

The report summarizes the geological and geophysical activities which were undertaken during Leg 2 (Dakar to Cape Town) of R/V CHAIN Cruise 115 (SOUTHLANT Expedition). A series of charts and profiles display the navigational, bathymetry, total field magnetic anomaly, and free air gravity anomaly measurements, as well as the locations of coring, camera and hydrographic stations. Author (GRA)

N75-10642# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AUTOMATION OF THE HYDROMETEOROLOGICAL SERVICE
B. G. Rozhdestvenekii 11 Jul. 1974 33 p Transl. into ENGLISH from Tr. Vses. Meteorol. Syezda (USSR), v. 1, 1972 p 110-127
(AD-782822; FTD-MT-24-1163-74) Avail: NTIS CSCL 04/2

General purpose digital computers are established in hydrometeorological centers for automated preparation of mode information. The large power EVM devices possess high productivity, have large storage, and are equipped for coupling with communication channels, charting devices, etc. Author (GRA)

N75-10643# Army Foreign Science and Technology Center, Charlottesville, Va.
DUST STORMS IN THE ALTAY TERRITORY
S. I. Kukis 25 Apr. 1974 14 p refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 12, 1968 p 74-79
(AD-783664; FSTC-HT-23-0414-74) Avail: NTIS

A study of dust storms in the Altay territory shows that there has been an increase over recent years. Apart from becoming more frequent, these storms are now lasting longer. In order to prevent the complete erosion of fertile soil, afforestation should be carried out to minimize the effects of the wind. Author (GRA)

N75-10644# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
THE 12808 LANCE, MISSILE NO. 2212, ROUND NO. 235 APT (18 JULY 1974) Meteorological Data Report
Jul. 1974 49 p
(DA Proj. 1T6-65702-D-127)
(AD-783476; DR-854) Avail: NTIS CSCL 04/2

Meteorological data gathered for the launching of 12808 Lance, Missile Number 2212, Round Number 235 APT, are presented in tabular form. Author (GRA)

N75-10645# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
THE 12813A LANCE, MISSILE NO. 2189, ROUND NO. 233 ECL (12 JULY 1974) Meteorological Data Report
Jul. 1974 55 p
(DA Proj. 1T6-65702-D-127)
(AD-783475; DR-852) Avail: NTIS CSCL 04/2

Meteorological data gathered for the launching of 12813A Lance, Missile Number 2189, Round Number 233 ECL, are presented in tabular form. Author (GRA)

N75-10646# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
THE 14810A LANCE MISSILE NOS. 2559/2561, ROUND NOS. 231 APT/232 APT (11 JULY 1974) Meteorological Data Report
Jul. 1974 36 p
(DA Proj. 1T6-65702-D-127)
(AD-783474; DR-851) Avail: NTIS CSCL 04/2

Meteorological data gathered for the launching of 14810A Lance, Missile Numbers 2559/2561, Round Numbers 231 APT/232 APT, are presented in tabular form. Author (GRA)

N75-10647# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
THE 16301 LITTLE JOHN MISSILE NO. 3194, ROUND NO. 715 RM(27 JUNE 1974) Meteorological Data Report
Jun. 1974 18 p
(DA Proj. 1T6-65702-D-127)
(AD-783472; DR-849) Avail: NTIS CSCL 04/2

Meteorological data gathered for the launching of 16301 Little John, Missile Number 3194, Round Number 714 RM, are presented in tabular form. Author (GRA)

N75-10648# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
THE 12810 LANCE, MISSILE NO. 2172, ROUND NO. 228 ECT (13 JUNE 1974) Meteorological Data Report
Jun. 1974 41 p
(DA Proj. 1T6-65702-D-127)
(AD-783468; DR-845) Avail: NTIS CSCL 04/2

Meteorological data gathered for the launching of 12810 Lance, Missile Number 2172, Round Number 228 ECT, are presented in tabular form. Author (GRA)

N75-10649# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
THE 16101 LITTLE JOHN, MISSLE NO. 3094, ROUND NO. 714 RM (19 JUNE 1974) Meteorological Data Report
Jun. 1974 16 p
(DA Proj. 1T6-65702-D-127)
(AD-783470; DR-847) Avail: NTIS CSCL 04/2

Meteorological data gathered for the launching of 16101 Little John, Missile Number 3094, Round Number 714 RM, are presented in tabular form. Author (GRA)

N75-10650# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
THE 12811 LANCE, MISSILE NO. 2242, ROUND NO. 2242, ROUND NO. 230 ECL (28 JUNE 1974) Meteorological Data Report
Jun. 1974 43 p
(DA Proj. 1T6-65702-D-127)
(AD-783473; DR-850) Avail: NTIS CSCL 04/2

Meteorological data gathered for the launching of 12811 Lance, Missile Number 2242, Round Number 230 ECL, are presented in tabular form. Author (GRA)

N75-10651# Atmospheric Sciences Lab., White Sands Missile Range, N.Mex.
THE 12811 LANCE, MISSILE NO. 2173, ROUND NO. 229 ECT (21 JUNE 1974) Meteorological Data Report
Jun. 1974 48 p
(DA Proj. 1T6-65702-D-127)
(AD-783471; DR-848) Avail: NTIS CSCL 04/2

Meteorological data gathered for the launching of 12811 Lance, Missile Number 2173, Round Number 229 ECT, are presented in tabular form. Author (GRA)

N75-10652# Naval Postgraduate School, Monterey, Calif.
APPLICATION OF SATELLITE CLOUD BRIGHTNESS DATA FOR LARGE SCALE TROPICAL ANALYSIS: A CORRELATION STUDY OF BRIGHTNESS AND 200-MB DIVERGENCE
Preliminary Report, Jul. 1973 - Jul. 1974
Chin-Pei Chang Aug. 1974 39 p refs Sponsored in part by Natl. Environ. Satellite Serv., Washington, D. C.
(AD-784366; NPS-51CJ74081) Avail: NTIS CSCL 04/2

The report is a preliminary analysis of digitized satellite cloud brightness data that will be used in developing a model for large-scale analysis over data-void tropical areas, which is based on Wallace's (1971) postulation that such data may be used to estimate vertical motion in the tropics. The relationship between satellite cloud brightness and large-scale 200 mb divergence on 5 degrees x 5 degrees grids in the tropical western North Pacific is examined from several angles. Correlation coefficients between the two fields are computed on a daily basis for the region of study and at each grid point for 8-month time series. (Modified author abstract) GRA

N75-10653# Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
ATMOSPHERIC MEASUREMENTS PROGRAM
J. R. Albertine Mar. 1974 63 p
(Contract N00017-72-C-4401)
(AD-784374; APL-TG-1234) Avail: NTIS CSCL 20/5

The report describes a program of atmospheric turbulence and attenuation measurements conducted at the APL laser range. Attenuation was measured simultaneously at 0.63, 1.06, and 10.6 micrometers during a variety of fog conditions. Turbulence was monitored at 0.63 and 10.6 micrometers in order to provide insight into the amplitude and frequency spectrum of this atmospheric turbulence. Author (GRA)

N75-10654# Army Foreign Science and Technology Center, Charlottesville, Va.
STATISTICAL ESTIMATION OF THE LIGHT PULSE DEFORMATION IN THE OPTICAL SOUNDING OF PLANE-STRATIFIED CLOUDS
V. E. Zuev, G. M. Krekov, and A. I. Popkov Sep. 1973 9 p refs Transl. into English from Izv. Vysshykh Uchebn. Zavedenii, Fiz. (Tomsk), no. 2, 1973 p 50-53
(AD-784245; FSTC-HT-23-1842-73) Avail: NTIS CSCL 04/2

The use in optical sounding systems of lasers with high power and short (up to 10 to the minus 9th power/sec) duration of the emitted pulse makes possible the identification of the lower and upper boundaries and spatial inhomogeneity of diffuse clouds with a resolution not attainable in searchlight sounding. The algorithm of the Monte-Carlo method used in the present article allows one to take into account the complex boundary conditions which arise in the propagation of a diverging, spatially restricted beam of light in a scattering medium with a stratified inhomogeneity; it also allows one to take into account the nonstationary condition of the process. (Modified author abstract) GRA

N75-10655# North Central Forest Experiment Station, St. Paul, Minn.
TABLES AND CONVERSIONS FOR MICROCLIMATOLOGY
Final Report
James M. Brown Dec. 1973 35 p
(PB-234158/4; FSGTR-NC-8) Avail: NTIS HC $3.25 CSCL 04B

A series of tables, charts, and conversion factors have been prepared for use in microclimatic and ecological studies. Included are: (1) the solution to various equations of radiant energy exchange; (2) solar radiation diagrams; (3) psychometric and (4) precipitation data; and unit conversion factors. GRA

N75-10656# Hawaii Univ., Honolulu. Water Resources Research Center.
SOME STATISTICAL ANALYSES OF HAWAIIAN RAINFALL
Technical Report, 1 Jul. 1970 - 30 Jun. 1971
Edmond D. H. Cheng and L. Stephen Lau Aug. 1973 64 p refs
(Contract DI-14-01-0001-3011)
(PB-233674/1; TR-72; W74-09655; OWRR-A-029-HI(1)) Avail: NTIS HC $3.75 CSCL 04B

Monthly rainfall data of several stations in Kalihi Basin, Manoa Basin, and Kaneohe Area, all on Oahu, and the central sloping area of Molokai were correlated to watershed parameters of the areas. Distance measured from the station to a common station located seaward from all stations has proven to be the most important of the three parameters studied, the other two being the exposure and the elevation of the area. Both linear and nonlinear regression functions were developed. The central tendency of the monthly rainfall for the high rainfall part of the southeastern part of the Island of Oahu was found to require approximately forty years of record to stabilize. GRA

N75-10657# New Mexico State Univ., University Park. Engineering Experiment Station.
JEMEZ ATMOSPHERIC WATER RESOURCES RESEARCH PROJECT, VOLUME 1: SUMMARY AND ACCOMPLISHMENTS Final Report
C. G. Keyes, Jr., F. D. Stover, J. V. Lunsford, and M. Lentner Jan. 1974 61 p refs
(Contract DI-14-06-D-6803)
(PB-234005/7) Avail: NTIS HC $5.75 CSCL 04B

The different schemes used by New Mexico State University on the evaluation of the randomized winter cloud seeding in the Jemez Mountain immediate target area are given in this report. The relative crude methods of evaluation that indicated beneficial results are: preliminary non-statistical evaluation scheme, refined preliminary non-statistical evaluation scheme, isohyetal examination of seeding effect, double ratio scheme, and the diurnal precipitation patterns versus seeding scheme. The meteorological partitioning technique used in conjunction with the nonparametric statistical analysis has indicated specific meteorological conditions associated with probable increases and decreases in precipitation while seeding wintertime storms. (Modified author abstract) GRA

N75-10658# New Mexico State Univ., University Park. Engineering Experiment Station.
JEMEZ ATMOSPHERIC WATER RESOURCES RESEARCH PROJECT. VOLUME 2: SPECIAL ASPECTS OF THE PROGRAM Final Report
C. G. Keyes, Jr., F. D. Stover, J. V. Lunsford, and M. Lentner Dec. 1973 142 p refs
(Contract DI-14-06-D-6803)
(PB-234006/5) Avail: NTIS HC $10.25 CSCL 04B

During the period 1 July 1969 to 31 September 1973, scientific studies on precipitation augmentation in the Jemez Mountains of northern New Mexico were conducted. The special aspects of the overall program are included in the report. The intent of this report is not to summarize each special aspect of the program, but to detail the activities and procedures of the project in arriving at the summary and accomplishments which appear in Volume 1 of the final report (PB-234 005). Numerous other reports of the project are referenced in this report when required. GRA

N75-10659# RAND Corp., Santa Monica, Calif.
ON CALCULATING RADIOACTIVE FLUXES AND TEMPERATURE CHANGES IN ATMOSPHERES OFF ARBITRARY STRUCTURE
R. Muegge and F. Moeller Jul. 1974 22 p refs Transl. into ENGLISH from Z. Geophys. (West Germany), v. 8, 1932 p 53-64
(Contract DAHC15-73-C-0181)
(AD-784442; R-1549-ARPA) Avail: NTIS CSCL 04/1

A graphical procedure is developed whereby radiative fluxes may be calculated, and thereby the temperature changes in atmospheres of arbitrary structure, taking into account the laws for the absorption of diffuse radiation with absorption coefficients that vary with wavelength. The absorption of direct solar radiation is also taken into account. GRA

N75-10660# RAND Corp., Santa Monica, Calif.
USER'S GUIDE TO AUXILIARY PROGRAMS FOR THE MINTZ-ARAKAWA ATMOSPHERIC MODEL

David S. Pass Jun. 1974 75 p refs
(Contract DAHC15-73-C-0181)
(AD-784443; R-1046-ARPA) Avail: NTIS CSCL 04/2

The paper documents six computer programs used by the Rand/ARPA Climate Dynamics Project in simulating the behavior of the global atmosphere to study the complex interactions that produce world climate. The primary research tool, the Mintz-Arakawa model, runs 25 hours computing time for a 60-day simulation, generating 2 billion numbers, of which 15 million are stored in 18 arrays. The MAPGEN, Map Display, and Zonal Profile programs, documented in this report, post-process this output into manageable and comprehensible maps, profiles, and tables. The Difference program calculates the differences between experiments for plotting by Map Display. Two auxiliary programs are also documented, Quick Look and Disk Initializer, which greatly facilitate use of the M/A program. (Modified author abstract) GRA

N75-10661# General Dynamics Corp., San Diego, Calif. Electro Dynamic Div.
INFRARED WATER VAPOR AND TEMPERATURE PROFILER Annual Report, 1 Jan. - 31 Dec. 1973
C. R. Claysmith May 1974 36 p refs
(Contract N00014-72-C-0175; NR Proj. 211-149)
(AD-783984; R-74-056) Avail: NTIS CSCL 04/2

The work conducted involved three separate pieces of hardware as well as a continuing software and theoretical development. On the hardware, Sensor 1, the first temperature profiler with remote capability was calibrated, field tested and its output data analyzed. RIAPS I, a remotely operable profiler with both temperature and humidity profiling capability was designed and constructed. A minicomputer data acquisition and processing system which allows profiles to be processed in real time was designed and constructed. It will be interfaced with the RIAPS I instrument to form a stand-alone profiling system. (Modified author abstract) GRA

N75-10662# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INTEGRATION OF EQUATIONS OF THE DYNAMICS OF THE ATMOSPHERE FOR SOLVING PROBLEMS IN CLIMATE THEORY
M. E. Shvets, V. A. Efimov, L. N. Magazenkov, and B. E. Shneerov 17 Jul. 1974 16 p refs Transl. into ENGLISH from Tr. Vses. Meteorol. Sezda, Seksiya Klimata (USSR), v. 3, 1972 p 49-56
(AD-783971; FTD-HT-23-1113-74) Avail: NTIS CSCL 04/2

Numerical experiments on the general circulation of the atmosphere describe how the mechanisms of this circulation operate, individually and jointly. They can also be used in the study of the causes of anomalies of the general circulation of the atmosphere which holds promise for solving the most important problems about the nature of the change in weather and climate, and points to ways of developing methods of long-range weather forecasting. GRA

N75-10663# Army Foreign Science and Technology Center, Charlottesville, Va.
DUST STORMS IN THE TRANSVOLGA
N. V. Bova 16 Apr. 1974 7 p refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 12, 1957 p 29-31
(AD-784174; FSTC-HT-23-415-74) Avail: NTIS CSCL 04/2

The report presents a study of dust storms in the Transvolga. It is known that these storms mainly occur where there is a warm wind and when the wind speed is above average. They are a danger for crops and cause soil erosion. Author (GRA)

N75-10664# Naval Postgraduate School, Monterey, Calif.
RECENT ADVANCES IN NUMERICAL WEATHER PREDICTION Technical Report, Jul. 1973 - Aug. 1974
G. J. Haltiner and R. T. Williams Aug. 1974 65 p refs Presented at the 54th Ann. Meeting of the Amer. Meteorol. Soc., Honolulu, Hawaii, 8-11 Jan. 1974
(AD-784364; NFS-51HAWU74081) Avail: NTIS CSCL 04/2

The report summarizes recent developments in numerical weather prediction during the past several years. (Modified author abstract) GRA

N75-10665# Naval Ammunition Depot, Crane, Ind.
ATMOSPHERIC PROPERTIES AND THEIR EFFECT ON TARGET ACQUISITION UNDER FLARE ILLUMINATION
Gerald S. Bradley 9 May 1974 50 p refs
(AD-783052; NAD-CR-RDTR-270) Avail: NTIS CSCL 04/2

The atmospheric parameters of wind speed, ceilings, and surface visibilities are defined for various parts of Europe. Analyses are performed to determine their effect on target acquisition under flare illumination. It was determined that adverse weather conditions can degrade the usefulness of flares quite significantly. Author (GRA)

N75-10666# Cramer (H.E.) Co., Inc., Salt Lake City, Utah.
METEOROLOGICAL STUDY FOR TOOELE ARMY DEPOT, VOLUME 1 Final Report
Paul E. Carlson and John A. Scuderi Aug. 1974 101 p refs
(Contract DAAD09-74-C-0006)
(AD-784572; DPG-FR-C965A-Vol-1) Avail: NTIS CSCL 04/2

A meteorological study concerned with the assurance of air quality during planned demilitarization operations at Tooele Army Depot, South Area (TEAD-S), was conducted by Dugway Proving Ground under the sponsorship of the Program Manager for the Demilitarization of Chemical Materiel. The purpose of this study was to investigate the diffusion aspects of air contaminant emissions from demilitarization operations at the proposed location as they are related to both State and Federal air quality standards and to additional standards as imposed by the Army for this operation. Continuous 1-hour plant stack emissions were simulated using a fluorescent particle tracer. Simulated emissions were made over a wide variety of atmospheric conditions. The behavior of this material has been studied and analyzed. (Modified author abstract) GRA

N75-10667# Cramer (H.E.) Co., Inc., Salt Lake City, Utah.
METEOROLOGICAL STUDY FOR TOOELE ARMY DEPOT, VOLUME 2 Final Report
Paul E. Carlson and John A. Scuderi Aug. 1974 425 p
(Contract DAAD09-74-C-0006)
(AD-784573; DPG-FR-C965A-Vol-2) Avail: NTIS CSCL 04/2

The 10-minute and 60-minute averages of meteorological data recorded at Tower 1, at Station 2, and at Station 6 are reported. The data were recorded simultaneously on tape and on strip charts during the 35 trials conducted at TEAD-S. Data for trial A-4 were not included in this appendix. A malfunction in the computer tape drive resulted in faulty data. However, data available from strip charts made analysis of this trial possible. GRA

N75-10668# Army Foreign Science and Technology Center, Charlottesville, Va.
MAP DIAGRAM OF THE NUMBER OF DAYS WITH DUST STORMS IN THE HOT ZONE OF THE USSR AND ADJACENT TERRITORIES
S. A. Sapozhnikova 31 Oct. 1973 11 p refs Transl. into ENGLISH from Tr. Nauchn. Issled. Inst. Aeroklimatologii (Moscow), no. 65, 1970 p 61-68
(AD-784100; FSTC-HT-23-0027-74) Avail: NTIS CSCL 04/2

A map-diagram is presented showing the frequency of dust storms for the entire territory of the U.S.S.R. The increase in the frequency of dust storms after 1950 is noted. Charts are included to show the increase in dust storms, the distribution of stations with respect to the average yearly number of dust storms, and the differing frequency of dust storms inside and outside of cities. Author (GRA)

N75-10669# Army Foreign Science and Technology Center, Charlottesville, Va.
THE FREQUENCY OF THE MOST INTENSIVE DUST STORMS IN THE UKRAINE
V. I. Romushkevich 1 Oct. 1973 7 p Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 12, 1967 p 111-115
(AD-784101; FSTC-HT-23-0139-74) Avail: NTIS CSCL 04/2

The paper gives the characteristics of the most intensive dust storms observed in the Ukraine with winds having a velocity of more than 14 meters per second. The frequency of dust storms is considered by months with different wind directions, and their territorial distribution is analyzed. Author (GRA)

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N75-10670*# Florida Inst. of Tech., Melbourne.
A STUDY OF LAGOONAL AND ESTUARINE PROCESSES IN THE AREA OF MERRITT ISLAND ENCOMPASSING THE SPACE CENTER Annual Report, 1 Jul. 1973 - 31 Aug. 1974
31 Aug. 1974 69 p refs
(Grant NGR-10-015-008)
(NASA-CR-140601; AR-2) Avail: NTIS HC $4.25 CSCL 08C

A study was conducted to determine the marine biology and dynamic oceanographic properties of the Indian River in Florida. One of the major areas of concentration involved the compilation of a taxonomic list of marine animals in the river. An important conclusion of the study is that diversity of the benthic community is substantially higher than expected. The effect of major climatic factors on the diversity and structure of the benthic community is analyzed. Author

N75-10671*# Battelle Columbus Labs., Ohio.
INTERACTION OF MARINE GEODESY, SATELLITE TECHNOLOGY AND OCEAN PHYSICS
A. G. Mourad and D. M. J. Fubara Jun. 1972 105 p refs
(Contract NAS6-2006)
(NASA-CR-137470) Avail: NTIS HC $5.25 CSCL 08J

The possible applications of satellite technology in marine geodesy and geodetic related ocean physics were investigated. Four major problems were identified in the areas of geodesy and ocean physics: (1) geodetic positioning and control establishment; (2) sea surface topography and geoid determination; (3) geodetic applications to ocean physics; and (4) ground truth establishment. It was found that satellite technology can play a major role in their solution. For solution of the first problem, the use of satellite geodetic techniques, such as Doppler and C-band radar ranging, is demonstrated to fix the three-dimensional coordinates of marine geodetic control if multi-satellite passes are used. The second problem is shown to require the use of satellite altimetry, along with accurate knowledge of ocean-dynamics parameters such as sea state, ocean tides, and mean sea level. The use of both conventional and advanced satellite techniques appeared to be necessary to solve the third and fourth problems. Author

N75-10672*# City Coll. of the City of New York. Dept. of Earth and Planetary Sciences.
ATMOSPHERIC RESPONSE TO VARIATIONS IN SEA SURFACE TEMPERATURE
Jerome Spar and Robert Atlas Oct. 1974 33 p refs
(Grant NGR-33-013-086)
(NASA-CR-140604; Contrib-37) Avail: NTIS HC $3.75 CSCL 08J

An extended range prediction experiment was performed with the GISS atmospheric model on a global data to test the sensitivity of the model to sea surface temperature (SST) variation over a two-week forecast period. The use of an initial observed SST field in place of the climatological monthly mean sea temperatures for surface flux calculations in the model was found to have a significant effect on the predicted precipitation over the ocean, with enhanced convection computed over areas where moderately large warm SST anomalies are found. However, there was no detectable positive effect of the SST anomaly field on forecast quality. The influence of the SST anomalies on the daily predicted fields of pressure and geopotential is relatively insignificant up to about one week compared with the growth of prediction error, and is no greater over a two-week period than that resulting from random errors in the initial meteorological state. The 14-day average fields of sea level pressure and 500-mb height predicted by the model, appear to be similarly insensitive to anomalies of sea surface temperature. Author

N75-10673*# Battelle Columbus Labs., Ohio.
BISTATIC RADAR SEA STATE MONITORING
George T. Ruck, Donald E. Barrick, and Thaddeus Kaliszewski Jun. 1972 124 p refs
(Contract NAS6-2006)
(NASA-CR-137469) Avail: NTIS HC $5.25 CSCL 08C

Bistatic radar techniques were examined for remote measurement of the two-dimensional surface wave height spectrum of the ocean. One technique operates at high frequencies (HF), 3-30 MHz, and the other at ultrahigh frequencies (UHF), approximately 1 GHz. Only a preliminary theoretical examination of the UHF technique was performed; however the principle underlying the HF technique was demonstrated experimentally with results indicating that an HF bistatic system using a surface transmitter and an orbital receiver would be capable of measuring the two-dimensional wave height spectrum in the vicinity of the transmitter. An HF bistatic system could also be used with an airborne receiver for ground truth ocean wave spectrum measurements. Preliminary system requirements and hardware configurations are discussed for both an orbital system and an aircraft verification experiment. Author

N75-10674# World Meteorological Organization, Geneva (Switzerland).
REPORT OF THE MEETING ON DRIFTING BUOYS FOR THE FIRST GARP GLOBAL EXPERIMENT
Mar. 1974 91 p Conf. held at Geneva, Mar. 1974 Prepared jointly with Intern. Council for Sci. Unions
(GARP-Spec-Rept-13) Avail: NTIS HC $4.75; WMO, Geneva

Within the framework of the first GARP global experiment, the status of the development of the buoy observing systems appropriate for the experiment is discussed. The requirements of the minimum capability of buoys for the experiment as well as the requirements for the polar orbiting system for the drifting buoy observing program are outlined. The deployment strategy, steps towards realization of the buoy system, and possible oceanographic programs during the FGGE using expendable buoys are also described. ESRO

N75-10675# Informatics, Inc., Rockville, Md.
BIBLIOGRAPHY OF SOVIET MATERIAL ON INTERNAL WAVES, JANUARY - MARCH 1974
Stuart G. Hibben 17 Jun. 1974 32 p refs
(Contract F44620-72-C-0053; ARPA Order 1622-4)
(AD-782018; AFOSR-74-0968TR) Avail: NTIS CSCL 08/3

The report is the second bibliography of Soviet publications relating to internal wave problems, retrieved during the first quarter of 1974. The main selection criteria are studies of small-scale variations in ocean parameters, and of airborne techniques for deducing internal wave conditions. A few older references are included for interest. Author (GRA)

N75-10676# Washington Univ., Seattle. Dept. of Oceanography.
COASTAL UPWELLING ECOSYSTEMS ANALYSIS. DATA REPORT 13: RADIATION MEASUREMENTS OFF THE OREGON COAST JULY/AUGUST 1973
Ronald K. Reed and David Halpern Apr. 1974 55 p refs Prepared in cooperation with NOAA, Washington, D. C.
(Contract NSF AG-299)
(PB-233958/8; Ref-M74-18; NSF/IDOE-74-16) Avail: NTIS HC $3.75 CSCL 08J

Radiation measurements made aboard ship, from buoys, and at a coastal station during July and August 1973 (CUE-2) are described. Mean daily values of incident shortwave radiation, net radiation, and effective back radiation are presented. Plots of shortwave radiation and net radiation are also shown. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N75-10677 Auburn Univ., Ala.
THE EFFECTS OF LUNAR CYCLES AND DIURNAL RHYTHMS ON ACTIVITY, EXPLORATION, AND ELICITED AGGRESSION IN RATS AND MICE Ph.D. Thesis
Delmar Stanley Paul Bisbee 1974 198 p
Avail: Univ. Microfilms Order No. 74-19372

The effects of the phases of the moon on general activity, exploration, elicited agression, animal body weight, and the

stability of these effects across three consecutive lunar months are studied. The relative effects of night and day on activity, exploration, and aggression, and the normal monthly activity cycle of rats in a running wheel are also observed. The findings are (1) activity in rats follows a lunar cycle pattern of differences across phases with peaks at the full and new moon; (2) activity in mice shows a pattern of phase differences with a peak at the first quarter; (3) exploration measures did not show lunar influences; (4) aggression measures demonstrate differences across phases, with a peak at the new moon; (5) both rats and mice have a higher level of general activity at night than during the day; and (6) comparisons of general and running wheel activity show similarities in lunar month patterns. Dissert. Abstr.

N75-10678*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SELF-STERILIZATION OF BODIES DURING OUTER PLANET ENTRY
A. R. Hoffman, W. Jaworski, and D. M. Taylor Jun. 1974 21 p refs Presented at the 17th Plenary Meeting of COSPAR, Sao Paulo, Brazil, 17 Jun. - 1 Jul. 1974
(Contract NAS7-100)
(NASA-CR-140808; Paper-L.4.2) Avail: NTIS HC $3.25 CSCL 06M

A body encountering the atmosphere of an outer planet is subjected to heat loads which could result in high temperature conditions that render terrestrial organisms on or within the body nonviable. To determine whether an irregularly shaped entering body, consisting of several different materials, would be sterilized during inadvertent entry at high velocity, the thermal response of a typical outer planet spacecraft instrument was studied. The results indicate that the Teflon insulated cable and electronic circuit boards may not experience sterilizing temperatures during a Jupiter, Saturn, or Titan entry. Another conclusion of the study is that small plastic particles entering Saturn from outer space have wider survival corridors than do those at Jupiter. Author

N75-10679*# Kanner (Leo) Associates, Redwood City, Calif.
PROBLEMS OF SPACE BIOLOGY. VOLUME 27: RADIOBIOLOGY AND GENETICS OF ARABIDOPSIS
V. I. Ivanov Washington NASA Oct. 1974 192 p refs Transl. into ENGLISH from the book "Problemy Kosmicheskoy Biologii. Tom. 27. Radiobiologiya i Genetika Arabidopsisa" Moscow, Nauka Press, 1974 p 1-191
(Contract NASw-2481)
(NASA-TT-F-15849) Avail: NTIS HC $7.00 CSCL 06C

Arabidopsis thaliana is discussed as an optimum object of aerospace research on radiobiology, radiation genetics and general botanical research. Varied aspects of plant research are considered: survival, growth, development, fertility, effects of irradiation, sexual and asexual reproduction under zero gravity. The importance of the abundance of arabidopsis mutants and their small size are cited as some of the important merits of this plant's use as an object of space research. Author

N75-10680# Centraal Instituut voor Voedingsonderzoek TNO, Zeist (Netherlands).
EFFECT OF STRESS ON FAT METABOLISM IN CONNECTION WITH FAT CONTENTS OF EMERGENCY RATIONS [DE INVLOED VAN STRESS OP DE VETSTOFWISSELING IN VERBAND MET HET VETGEHALTE VAN NOODRANTSOENEN]
W. VanDokkum, comp. Dec. 1973 27 p refs In DUTCH
(R-4255) Avail: NTIS HC $3.25

A literature survey on the effects which physiological and psychic stress can have on fat metabolism is presented in connection with an investigation aimed at reducing the fat content of emergency rations for the armed forces. Some data are given on the caloric constitution of a number of emergency rations discussed in literature. It is concluded that as a result of the accumulation of ketone compounds in the blood, stress can have an unfavorable effect on fat metabolism, and therefore on water balance and physical work. It is recommended that the fat contents of emergency rations be reduced to about 20% in favor of carbohydrates. ESRO

N75-10681# Florida State Univ., Tallahassee.
THE COHO PROJECT: LIVING RESOURCES PREDICTION FEASIBILITY STUDY, VOLUME 1 Final Report
James J. Brien, Bruce M. Woodworth, and David J. Wright 1974 37 p refs Prepared in cooperation with Oregon State Univ. (Grants NOAA-043-022-28; NSF GX-33502)
(PB-234057/8; NSF/IDOE-74-18) Avail: NTIS HC $3.25 CSCL 08C

The Coho project demonstrated a system which provides a substantial improvement in fish finding technique. It is the first known system which combines oceanographic and meteorological variables with the knowledge that certain species are temperature dependent, in order to arrive at an accurate forecast of the location of harvestable concentrations of salmon. The area chosen to test the prediction system was off the central coast of Oregon between Cape Lookout and Seal Rock. GRA

N75-10682# Florida State Univ., Tallahassee.
THE COHO PROJECT: LIVING RESOURCES PREDICTION FEASIBILITY STUDY. VOLUME 2: ENVIRONMENTAL REPORT
James J. OBrien, Bruce M. Woodworth, and David J. Wright 1974 191 p Prepared in cooperation with Oregon State Univ. (Grants NOAA-043-022-28; NSF GX-33502)
(PB-234058/6; NSF/IDOE-74-19) Avail: NTIS HC $5.50 CSCL 06C

The Coho project was a pilot project to study the application of remote sensing techniques for the benefit of the Central Oregon offshore Coho fishery. The system, designed to provide a true daily forecast of environmental factors conductive to concentrations of harvestable stocks of Coho salmon, was operated to include the offshore area between Cape Lookout (45 deg 20.5 min N) and Seal Rock (44 deg 30 min N) along the Central Oregon coast, during the period June 15, 19 1973, to August 16, 1973. This volume contains the data on all relevant environmental factors utilized in the prediction studies. GRA

N75-10683# Florida State Univ., Tallahassee.
THE COHO PROJECT: LIVING RESOURCES PREDICTION FEASIBILITY STUDY. VOLUME 3: SYSTEM EVALUATION REPORT
James J. OBrien, Bruce M. Woodworth, and David J. Wright 1974 64 p Prepared in cooperation with Oregon State Univ. (Grants NOAA-043-022-28; NSF GX-33502)
(PB-234059/4; NSF/IDOE-74-20) Avail: NTIS HC $3.75 CSCL 06C

The Coho salmon is known to be a temperature dependent species preferring the relatively warm waters in the 52 degrees to 56 degrees Fahrenheit range. The upwelling phenomenon, on the other hand, brings cold water into the Coho habitat thus tending to drive the fish away. The cold water, however, is laden with nutrients which stimulate the initial phases of the food chain at the top of which exists the salmon. It is to be expected, and was presumed in this study, that Coho would be found on the warmer side of the interface of the upwelled and stabilized waters. This volume is devoted to the evaluation of a pilot prediction system operating off the central Oregon coast. The economic merits along with some unfavorable comments are set forth. GRA

N75-10557* Environmental Research Inst. of Michigan, Ann Arbor.
UTILITY OF ERTS FOR MONITORING THE BREEDING HABIT OF MIGRATORY WATERFOWL
Edgar W. Work, Jr., David S. Gilmer (Northern Prairie Wildlife Res. Center), and A. T. Klett (Northern Prairie Wildlife Res. Center) *In* NASA. Goddard Space Flight Center Third ERTS Symp., Vol. 2 May 1974 p 102-115 refs (For availability see N75-10549 01-43)
CSCL 06C

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N75-10684*+ National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING

BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 132
Sep 1974 84 p refs
(NASA-SP-7011(132)) Avail: NTIS HC $4.00 CSCL 06E

This special bibliography lists 261 reports, articles, and other documents introduced into the NASA scientific and technical information system in August 1974. Author

N75-10685*# Linguistic Systems, Inc., Cambridge, Mass.
MOTION SICKNESS
N. Razsolov and K. Andronik Washington NASA Oct. 1974 7 p Transl. into ENGLISH from Med. Gaz. (USSR), 24 May 1974 p 3
(Contract NASw-2482)
(NASA-TT-F-15864) Avail: NTIS HC $3.25 CSCL 06E

The theory and prophylaxis of motion sickness are reviewed. The V.I. Voyachkov and K.L. Khilov otolith theory of the causes of motion sickness is discussed, and G.L. Komendantov's definition of four stages of motion sickness is outlined. Further studies of the pathogenesis of the disease are mentioned. It is noted that double-axis rotation with intermittent and continuous Coriolis accelerations is used to test candidates for piloting and other occupations. Drug therapy now in use for motion sickness is described: the drug now in use is plavefin (the one previously used, 'Aeron', was ineffective and caused severe side effects). Also mentioned are suppositories with 0.3 to 0.7 g of sodium bicarbonate which are used daily for 21 days. However, 50 ml of a 4 to 5% solution of sodium hydrocarbonate administered intravenously appears to be the most effective pharmaceutical means of inhibiting the development of motion sickness. Author

N75-10686*# Techtran Corp., Glen Burnie, Md.
ALTERATIONS OF COLOR SENSATION UNDER HYPOXIC CONDITIONS
B. S. Frantzen and A. I. Yusfin Washington NASA Oct. 1974 13 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 44, no. 6, 1958 p 519-525
(Contract NASw-2485)
(NASA-TT-F-15879) Avail: NTIS HC $3.25 CSCL 06S

The influence of oxygen deficiency on color discrimination was investigated. Oxygen deficiency at moderate altitudes (2000 to 3000 M) seems to increase color discrimination; at higher altitudes (6000 to 7000m) it decreases. It was found that the greater the visual acuity of a set of receptors at sea level, the greater their reduction from oxygen deficiency at higher altitudes. Author

N75-10687*# Scientific Translation Service, Santa Barbara, Calif.
THE PROBLEM OF HUMAN STATOKINETIC STABILITY IN AVIATION AND SPACE MEDICINE
V. I. Kopanev Washington NASA Oct. 1974 52 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 4, 1974 p 476-498
(Contract NASw-2483)
(NASA-TT-F-15933) Avail: NTIS HC $4.25 CSCL 06P

A scientific basis for statokinetic stability is provided. The character of its changes under conditions of aviation and space flight is described, and ways of preventing statokinetic disorders are identified. Statokinetic stability is defined as the capacity of the organism to maintain stable working capacity, spatial orientation, and the function of equilibrium during the organism's exposure to factors that appear during passive and active movements in space (accelerations, optokinetic stimuli). Author

N75-10688*# Kanner (Leo) Associates, Redwood City, Calif.
MAN IN SPACE ORBIT
S. P. Umanskiy Washington NASA Oct. 1974 109 p refs Transl. into ENGLISH of the book "Chelovek na Kosmicheskoy Orbite" Moscow, Mashinostr. Press, 1974 p 1-139
(Contract NASw-2481)
(NASA-TT-F-15973) Avail: NTIS HC $5.25 CSCL 06P

A brief description of earth and its environment in space is given, as well as the effects of flight on the human body. Manned spacecraft, their life support systems and means of rescue are described and illustrated in some detail. Discussion, data and illustrations of astronauts equipment, including personal, protective, emergency rescue equipment and means of moving in open space detailing descriptions of space suits and various existing and planned vehicles for movement on the surface of the moon are described and illustrated. Author

N75-10689*# Scientific Translation Service, Santa Barbara, Calif.
THE DEPENDENCE OF REACTION TIMES ON THE LOCATION OF THE STIMULUS
G. S. Hall Washington NASA Oct. 1974 16 p refs Transl. into ENGLISH from Arch. Anatomie Physiol. (West Germany), 1879 p 1-10
(Contract NASw-2483)
(NASA-TT-F-16001) Avail: NTIS HC $3.25 CSCL 06P

Reaction times to stimuli were measured using simple apparatus in the upper arm, index finger and retina. It is found that reduced reaction times are not noticeably different for various parts of the body. In the case of the eye, the reaction times are similar to other functions. Therefore, the reaction method cannot be used to determine the sensible and motor conduction velocity and at the present time, the conduction velocity in the long paths of the spine are unknown. Author

N75-10690*# California Univ., Berkeley. White Mountain Research Station.
IN VIVO MEASUREMENT OF HUMAN BODY COMPOSITION Semiannual Status Report, 1 Jan. - 30 Jun. 1974
Nello Pace, Benjamin W. Grunbaum, Arthur M. Kodama, and David C. Price 30 Jun. 1974 101 p
(Grant NGR-05-003-470)
(NASA-CR-140668; SASR-4) Avail: NTIS HC $5.25 CSCL 06P

The female bed rest study has shown that, the response of women to prolonged recumbency of 2 to 3 weeks duration is very similar to that displayed by men. Some of the key findings in the women after 17 days of continuous recumbency are: (1) a decrease in plasma volume of 12-13 per cent; (2) a small decrease in total body water; (3) a decrease in total body potassium of 3 to 4 per cent; (4) a decrease in plasma potassium concentration of 4 to 5 per cent; (5) a decrease in total circulating plasma protein of 11 to 12 per cent; (6) a decrease in urinary norepinephrine excretion rate of 27 to 28 per cent; (7) a possible increase in urinary magnesium, calcium, and phosphate excretion rates; and (8) a possible increase in urinary citrate excretion rate. Author

N75-10691*# Texas Univ., Houston. School of Public Health.
PROBABILITY OF ILLNESS DEFINITION FOR THE SKYLAB FLIGHT CREW HEALTH STABILIZATION PROGRAM Final Report
[1974] 96 p
(Contract NAS9-12783)
(NASA-CR-140300) Avail: NTIS HC $4.75 CSCL 06E

Management and analysis of crew and environmental microbiological data from SMEAT and Skylab are discussed. Samples were collected from ten different body sites on each SMEAT and Skylab crew-member on approximately 50 occasions and since several different organisms could be isolated from each sample, several thousand lab reports were generated. These lab reports were coded and entered in a computer file and from the file various tabular summaries were constructed. Author

N75-10692# Oregon State Univ., Corvallis. Dept. of Agricultural Economics.
OUTPATIENT MEDICAL COSTS RELATED TO AIR POLLUTION IN THE PORTLAND, OREGON AREA
John A. Jaksch and Herbert H. Stoevener Washington, D. C. EPA Jul. 1974 133 p refs
(Contract EPA-68-01-0423)
(EPA-600/5-74-017) Avail: SOD HC $2.00

The effects of air pollution on the consumption of outpatient medical services were quantified in monetary terms, according to the hypotheses were that air pollution can aggravate a state of health resulting in increased consumption of outpatient medical services and in the number of contacts with the medical system for certain respiratory, cardiovascular, and other diseases aggravated by air pollution. The study period was 1969-1970, and centered in the Portland, Oregon area. Statistical models were formulated, explaining individual outpatient consumption of medical services. Measures of suspended particulate air

pollution and meteorological conditions, as well as socioeconomic-demographic variables thought to influence the consumption of medical services, were included in the models as explanatory variables. Author

N75-10693*# California Univ., San Diego. Dept. of Radiology.
A SIMPLE METHOD FOR THE GENERATION OF ORGAN AND VESSEL CONTOURS FROM ROENTGENOGRAPHIC OR FLUOROSCOPIC IMAGES
John D. Newell, Robert A. Keller, and Norman A. Baily [1974] 13 p refs
(Grant NGR-05-009-257)
(NASA-CR-140685) Avail: NTIS HC $3.25 CSCL 06E

A simple method for outlining or contouring any area defined by a change in film density or fluoroscopic screen intensity is described. The entire process, except for the positioning of an electronic window, is accomplished using a small computer having appropriate softwave. The electronic window is operator positioned over the area to be processed. The only requirement is that the window be large enough to encompass the total area to be considered. Author

N75-10694*# Wisconsin Univ., Madison. Bone Mineral Lab.
APPLICATIONS OF THE DIRECT PHOTON ABSORPTION TECHNIQUE FOR MEASURING BONE MINERAL CONTENT IN VIVO. DETERMINATION OF BODY COMPOSITION IN VIVO Annual Progress Report, 15 Jul. 1971 - 15 Jul. 1972
John R. Cameron 1 Aug. 1972 157 p refs
(Grant NGR-50-002-051; Contract AT(11-1)-1422)
(NASA-CR-140708) Avail: NTIS HC $6.25 CSCL 06P

The bone mineral content, BMC, determined by monoenergetic photon absorption technique, of 29 different locations on the long bones and vertebral columns of 24 skeletons was measured. Compressive tests were made on bone from these locations in which the maximum load and maximum stress were measured. Also the ultimate strain, modulus of elasticity and energy absorbed to failure were determined for compact bone from the femoral diaphysis and cancellous bone from the eighth through eleventh thoracic vertebrae. Correlations and predictive relationships between these parameters were examined to investigate the applicability of using the BMC at sites normally measured in vivo, i.e. radius and ulna in estimating the BMC and/or strength of the spine or femoral neck. It was found that the BMC at sites on the same bone were highly correlated r = 0.95 or better; the BMC at sites on different bones were also highly interrelated, r = 0.85. The BMC at various sites on the long bones could be estimated to between 10 and 15 per cent from the BMC of sites on the radius or ulna. Author

N75-10695*# Wisconsin Univ., Madison. Bone Mineral Lab.
SKELETAL STATUS AND SOFT TISSUE COMPOSITION IN ASTRONAUTS. TISSUE AND FLUID CHANGES BY RADIONUCLIDE ABSORPTIOMETRY IN VIVO Annual Progress Report, 15 Jul. 1972 - 15 Jul. 1973
John R. Cameron, Richard B. Mazess, and Charles R. Wilson 1 Aug. 1973 153 p refs
(Grants NGR-50-002-051; NGR-50-002-183; Contract AT(11-1)-1422)
(NASA-CR-140689) Avail: NTIS HC $6.25 CSCL 06P

A device has been constructed and tested which provides immediate readout of bone mineral content and bone width from absorptiometric scans with low energy radionuclides. The basis of this analog system is a logarithmic converter-integrator coupled with a precision linear ratemeter. The system provided accurate and reliable results on standards and ashed bone sections. Clinical measurements were made on about 100 patients with the direct readout system, and these were highly correlated with the results from digital scan data on the same patients. The direct readout system has been used successfully in field studies and surveys as well as for clinical observations. Author

N75-10696*# Wisconsin Univ., Madison. Bone Mineral Lab.
SKELETAL STATUS AND SOFT TISSUE COMPOSITION IN ASTRONAUTS. TISSUE AND FLUID CHANGES BY RADIONUCLIDE ABSORPTIOMETRY IN VIVO Annual Progress Report, 15 Jul. 1973 - 15 Jul. 1974
John R. Cameron, Richard B. Mazess, and Charles R. Wilson 1 Aug. 1974 154 p refs
(Grants NGR-50-002-051; NGR-50-002-183; Contract AT(11-1)-1422)
(NASA-CR-140703) Avail: NTIS HC $6.25 CSCL 06P

Research on the measurement of bone mineral content and body composition ranges from isotopic tracer methods and the adoption of clinical standards to osteoporosis therapy and the effects of nutritional factors on bone loss. G.G.

N75-10697# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
INVESTIGATIONS ON THE DAY-NIGHT-DIFFERENCES OF PHYSICAL PERFORMANCE CAPACITY Ph.D. Thesis - Bonn Univ.
Dietmar Weddige 25 Mar. 1974 71 p refs In GERMAN; ENGLISH summary
(DLR-FB-74-29) Avail: NTIS HC $4.25; DFVLR, Porz, West Ger. 26,50 DM

To investigate day-night differences of physical performance capacity, the maximal oxygen uptake in 16 male subjects during the day and the night was measured. Maximal oxygen uptake was slightly but statistically significantly higher during the night. In view of the fact, that at the same time maximal working time and performance were significantly lower, a poorer effectiveness during the night must be assumed. Author (ESRO)

N75-10698# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
ORAL AND RESPIRATORY IMMUNIZATION [ORALE EN RESPIRATOIRE IMMUNISATIE]
H. C. Bartlema 1974 8 p refs In DUTCH
(MBL-1974-4) Avail: NTIS HC $3.25

The possibility of using oral and respiratory vaccines in the treatment of infectious diseases is considered. The advantage of this type of local immunization was examined in regard to infections which act only on those organs forming the entry gate, and in comparison to those cases in which parenteral vaccination would be advantageous. ESRO

N75-10699# Unilever Research, Vlaardingen (Netherlands).
MEASUREMENT OF PLATELET AGGREGATION IN FLOWING BLOOD WITH THE USE OF A FILTER
G. Hornstra and S. Y. Gielen [1973] 21 p refs Submitted for publication
Avail: NTIS HC $3.25

Techniques are presented to measure ADP-induced platelet aggregation in circulating arterial rat blood and spontaneous aggregation in flowing venous blood of man. The filter-loop technique is a valuable method in assessing the in vivo effects of drugs and dietary treatment on platelet aggregation tendency. The anti-thrombotic effect of aspirin was confirmed, as was the effect of some haemostatic disorders. The anti-aggregating effect of dietary linoleic acid was shown convincingly. The filtragometer seems very useful as an additional device in thrombosis research. Author (ESRO)

N75-10700# Flying Personnel Research Committee, London (England).
THE GENERATION OF SACCADIC EYE MOVEMENTS IN VESTIBULAR NYSTAGMUS
G. R. Barnes Sep. 1973 38 p refs
(AD-784128; FPRC-1325) Avail: NTIS CSCL 06/16

A model has been developed for the mechanism of saccadic generation in the vestibulo-ocular reflex arc, in an attempt to explain variations in the pattern of nystagmic response to vestibular stimulation. The model has been developed using an analogue computer and an attempt has been made to relate the system to the known physiological evidence. The response of the model has been compared with results from experiments on human subjects, and satisfactory agreement has been obtained in conditions appropriate to stimulation of the canals by both periodic and transient angular accelerations and further, to stimulation of the utricular maculae by linear acceleration. The model effectively simulates the changes in frequency and duration of slow phase and saccadic eye movements observed in experiments.
Author (GRA)

N75-10701# Lecler (Michel), Inc., Harvey, La.
REPORT ON PROJECT HYDROX 2 Final Report
Peter O. Edel 15 Aug. 1974 75 p refs
(Contract N00014-73-C-0233)
(AD-784446) Avail: NTIS CSCL 06/19

Since the world's supply of helium resources is diminishing, future deep diving operations may depend on substitutes for helium in breathing mixtures. On the basis of its physical constants, hydrogen would seem to be the most promising replacement for helium as an oxygen diluent in breathing mixtures for human exposure to very high pressures. The experimental program involved four volunteer diver-subjects, each of whom was exposed on two separate occasions to 7.06 absolute atmosphere (ATA) for a period of 113 minutes while breathing a mixture of 97%H2-3%O2 for a total number of 24 dives. Each subject was exposed to each breathing mixture twice during the program. During the exposures, a work load was performed by the subjects and performance measurements were made. The subjects: responses to decompression profiles for the three oxygen diluents were evaluated to provide provisional values with regard to hydrogen concerning uptake and elimination time for gas transport in the human body. (Modified author abstract) GRA

N75-10702# Rensselaer Polytechnic Inst., Troy, N.Y.
HIGH ALTITUDE PULMONARY EDEMA Annual Progress Report, 1 May 1973 - 30 Apr. 1974
Gerald Moss Jun. 1974 56 p refs
(Contract DADA17-72-C-2121)
(AD-782240; APR-2) Avail: NTIS CSCL 06/5

A centrineurogenic etiology for the pulmonary lesions of high altitude pulmonary edema (HAPE) and oxygen toxicity (OT). The authors developed canine models for induction of these lesions in the unanesthetized beagle with respiratory hypoxia or 100% O2 at ambient pressure and at elevated pressures. A discussion of the experimental results is reported. GRA

N75-10703# National Research Council, Washington, D.C. Committee on Toxicology.
A REVIEW OF THE TOXICOLOGY RESEARCH PROGRAM OF THE 6570TH AEROSPACE MEDICAL RESEARCH LABORATORY, WRIGHT-PATTERSON AIR FORCE BASE, OHIO Final Report, Sep. 1973 - Jun. 1974
Jun. 1974 78 p refs
(Contract N00014-67-A-0244-0015)
(AD-782249; NRC-TOX-P795) Avail: NTIS CSCL 06/20

The Committee on Toxicology of the National Academy of Sciences-National Research Council, concluded that there is good reason for the Air Force to maintain an independent laboratory for toxicology research. It found the toxicology evaluation program to be functioning well and providing information and services adequate for Air Force needs. It reported that the methods are appropriate, the research is productive, and the program is relevant to the Air Force needs. It noted that the Air Force has established cooperative programs with other federal and civilian agencies to avoid duplication of effort on common problems. It suggested that some auxiliary functions, e.g., the advisory function and fundamental research, could be strengthened. GRA

N75-10704# Air Force Academy, Colo.
FOIL ACTIVATION ANALYSIS AND THERMOLUMINESCENT DOSIMETRY ON SKYLAB 2 Final Report, Apr. 1973 - Jul. 1974
Louis F. Wailly, John W. Watters, and Peter B. Carter Jul. 1974 27 p refs
(AD-783779; USAFA-TR-74-11) Avail: NTIS CSCL 06/18

The Skylab II Command Module was equipped with passive dosimeter located at five selected stations within the spacecraft to monitor radiation levels accumulated during the 28 day space mission. The passive sensors consisted of an array of thermoluminescent devices (TLD) ionization chambers, and activation foils. The thermoluminescent units chosen were the EG and G Corporation evaculated glass container type. Both lithium fluoride and manganese activated calcium fluoride were selected for use in the Skylab missions. (Modified author abstract) GRA

N75-10705# Army Foreign Science and Technology Center, Charlottesville, Va.
STATOKINETIC REACTIONS OF MAN UNDER CONDITIONS OF SHORT TERM WEIGHTLESSNESS
I. A. Kolosov 22 Feb. 1974 15 p refs Transl. into English from Izv. Akad. Nauk SSR, Ser. Biol. (USSR) no. 5, 1969 p 736-741
(AD-784142; FSTC-HT-23-0291-74) Avail: NTIS CSCL 06/19

The purpose of the study was to investigate the character and acuteness of statokinetic reactions of man under conditions of short duration weightlessness and their dependence on past flight experience, to elaborate criteria for evaluating statokinetic resistance to short duration weightlessness, and to study the adaptive capacities of the organism. The test subjects underwent multiple physiological studies of their sensory, vegetative, motor, and vestibulo-somatic reactions. During the familiarization flights for weightlessness, most of the test subjects showed statokinetic disturbances in the form of psychosensory, vegetative, and motor disorders. The degree of acuteness of the statokinetic disturbances was found to be in inverse relation to the previous flight experience of the test subjects, with disturbances being observed in 16.7% of the pilots and in 81.9% of the non-pilots during the first familiarization flights. GRA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N75-10706# Advisory Group for Aerospace Research and Development, Paris (France).
COLD: PHYSIOLOGY, PROTECTION AND SURVIVAL
Fridtjov Vogt Lorentzen (Roy. Norwegian Air Force, Oslo) Aug. 1974 44 p refs
(AGARD-AG-194; AGARDograph-194) Avail: NTIS HC $3.75

The possibility of survival in a cold environment alone or in combination with other physical stresses, lies more in the field of technology and engineering, than in modifying human physiology. Practical points concerning survival techniques and equipment are discussed. The more serious problem encountered by a single man with simple equipment which has the highest possible efficiency/weight ratio is considered. Author

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N75-10707*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PLANETARY QUARANTINE: SPACE RESEARCH AND TECHNOLOGY Semiannual Review, 1 Jan. - 30 Jun. 1974
30 Sep. 1974 126 p refs
(Contract NAS7-100)
(NASA-CR-140806; JPL-900-675) Avail: NTIS HC $5.75 CSCL 06M

The impact of satisfying satellite quarantine constraints on current outer planet mission and spacecraft designs is considered. Tools required to perform trajectory and navigation analyses for determining satellite impact probabilities are developed. Author

N75-10708*# Virginia Univ., Charlottesville. Dept. of Engineering Science and Systems.
MODELS OF SUBJECTIVE RESPONSE TO IN-FLIGHT MOTION DATA
A. N. Rudrapatna and I. D. Jacobson Jul. 1973 55 p refs
(Grant NGR-47-005-181)
(NASA-CR-140675; TR-403209) Avail: NTIS HC $4.25 CSCL 05E

Mathematical relationships between subjective comfort and environmental variables in an air transportation system are investigated. As a first step in model building, only the motion variables are incorporated and sensitivities are obtained using stepwise multiple regression analysis. The data for these models

have been collected from commercial passenger flights. Two models are considered. In the first, subjective comfort is assumed to depend on rms values of the six-degrees-of-freedom accelerations. The second assumes a Rustenburg type human response function in obtaining frequency weighted rms accelerations, which are used in a linear model. The form of the human response function is examined and the results yield a human response weighting function for different degrees of freedom. Author

N75-10709# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
MEASUREMENT, EVALUATION, PREDICTION AND IMPROVEMENT OF AIRCRAFT RIDE Final Technical Report
Alvin B. Broderson Aug. 1973 43 p refs
(AF Proj. 7231)
(AD-783803; AMRL-TR-73-4) Avail: NTIS CSCL 05/5

The interrelated roles of the aircraft designer, flight dynamics specialist, and biomedical researcher are discussed as they relate to the various problems, definitions, procedures, and needs associated with measuring, evaluating, predicting, and improving aircraft ride. The importance of precise definitions and taxonomy for overall problem solution is emphasized. Standard and accurate vibration measurement techniques are discussed. Evaluation of ride in existing aircraft is discussed and distinguished from prediction of ride in proposed aircraft in regard to appropriate goals, limits, and criteria. Proper approaches for using gust environment, aircraft, and human frequency characteristics are discussed. Seat cushion, active isolation, and airframe dynamic control techniques for improving ride are discussed. Recommendations are made for improved biomedical research efforts to determine how and why vibration adversely affects aircraft pilots, crew and passengers, with emphasis on the need for closer dialogue and planning between the originator and user of biomedical research related to problems of aircraft ride.
Author (GRA)

N75-10710# Army Foreign Science anp Technology Center, Charlottesville, Va.
FOOD UNIT, BASED ON RESERVES OF DEHYDRATED PRODUCTS, IN LIFE SUPPORT SYSTEMS FOR CREWS OF SPACESHIPS DURING PROLONGED FLIGHTS
V. P. Bychkov 26 Feb. 1974 23 p refs Transl. into ENGLISH from Probl. Kosm. Biol. (USSR), v. 16, 1971 p 254-269
(AD-784289; FSTC-HT-23-1651-73) Avail: NTIS CSCL 06/8

Experiments were carried out to study the effects of dehydrated foods for crews of spaceships during prolonged flights. Those undergoing the tests were given dehydrated food equal in protein, carbohydrates and fats, to that eaten by people not carrying out manual work. The health, over a 4-month period, did not suffer, although there was a reduction in weight of examinees who weighed more than 75 kg at the outset. GRA

N75-10711# School of Aerospace Medicine, Brooks AFB, Tex.
PHYSIOLOGIC TESTING OF THE T-43 PASSENGER OXYGEN MASK Final Report, Dec. 1973 - Jan. 1974
William E. Pepelko Jun. 1974 15 p refs
(AF Proj. 7164)
(AD-783237; SAM-TR-74-9) Avail: NTIS CSCL 06/11

The passenger oxygen mask planned for use in the T-43 aircraft was tested for 3 hours at 25,000 ft equivalent altitude (282 mm Hg) in an altitude chamber. Ambient temperature was maintained at 65F. Six volunteer subjects were used. Inspired P(O2) averaged 195 mm Hg with a minimum of 122 mm Hg for any subject averaged over a 10-minute period. End-expired P(O2) averaged 143 mm Hg with a minimum of 103 mm Hg for any 10-minute period. End-expired P(CO2) averaged 34.2 mm Hg and respiration rate 14.6 breaths/min. The mean inspired and expired pressures in the mask averaged -0.54 inches of H2O and -0.18 inches of H2O respectively. No deterioration of performance could be detected with psychomotor testing. The mask was well accepted with no reports of discomfort. All runs were completed successfully with no evidence of hypoxia. It was concluded that the mask performed adequately under the test conditions over the 3-hour test period. Author (GRA)

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

N75-10712*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
CONSIDERATION OF PROBABILITY OF BACTERIAL GROWTH FOR JOVIAN PLANETS AND THEIR SATELLITES
D. M. Taylor, R. M. Berkman, and N. Divine Jun. 1974 18 p refs Presented at Joint Open Meeting of the Panel on Planetary Quarantine and Working Group 5, 17th Planetary Meeting of COSPAR, Sao Paulo, Brazil, 17 Jun. - 1 Jul. 1974
(Contract NAS7-100)
(NASA-CR-140807; Paper-V.4.4) Avail: NTIS HC $3.25 CSCL 06M

Environmental parameters affecting growth of bacteria are compared with current atmospheric models for Jupiter and Saturn, and with the available physical data for their satellites. Different zones of relative probability of growth are identified for Jupiter and Saturn. Of the more than two dozen satellites, only the largest (Io, Europa, Ganymede, Callisto, and Titan) are found to be interesting biologically. Titan's atmosphere may produce a substantial greenhouse effect providing increased surface temperatures. Models predicting a dense atmosphere are compatible with microbial growth for a range of pressures at Titan's surface. For Titan's surface the probability of growth would be enhanced if: (1) the surface is entirely or partially liquid; (2) volcanism is present; or (3) access to internal heat sources is significant. Author

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N75-10713# Advisory Group for Aerospace Research and Development, Paris (France).
GLOSSARY OF DOCUMENTATION TERMS. PART 2: COMPUTER-USER TERMS
D. C. C. Gibbs (Royal Naval Coll.) Sep. 1974 41 p refs
(AGARD-AG-182-Pt-2; AGARDograph-182-Pt-2) Avail: NTIS HC $3.75

A compendium of definitions and, where appropriate, descriptions are provided which will assist the computer user, particularly in the field of information science and documentation, to understand the terminology which proliferates in the field of computing. Although designed primarily for the user, it is hoped that computer personnel also will find the entries of some value when, for example, dealing with aspects of computing outside their own specialization. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering*.

N75-10714 Arizona State Univ., Tempe.
CONVERSION OF A D17B (MINUTEMAN 1) GUIDANCE COMPUTER TO ACQUIRE AND PROCESS EVOKED RESPONSE INFORMATION Ph.D. Thesis
Harry Steven Warford 1974 120 p
Avail: Univ. Microfilms Order No. 74-20151

An existing evoked response system was reviewed to form the basis for implementing an alternative system using the D17B (Minuteman-I) digital computer. Additional peripheral equipment was designed and constructed to augment the D17B's capability and to overcome its deficiencies. A software system was developed

to provide computer control of evoked response testing and data processing for both on-line and off-line experiments. The results collected demonstrated that the D17B system is capable of providing all necessary functions currently required for evoked response testing. Dissert. Abstr.

N75-10715*# Massachusetts Inst. of Tech., Cambridge.
RESEARCH STUDY OF A SELF-ORGANIZING COMPUTER Final Report
Mario R. Schaffner Jul. 1974 268 p refs
(Contract NASw-2276)
(NASA-CR-140599) Avail: NTIS HC $8.50 CSCL 09B

It is shown that a self organizing system has two main components: an organizable physical part, and a programing part. This report presents the organizable part in the form of a programable hardware and its programing language. Author

N75-10716# Brookhaven National Lab., Upton, N.Y.
CRYSNET: A NETWORK OF INTELLIGENT REMOTE GRAPHICS TERMINALS
H. J. Bernstein, L. C. Andrews, and F. C. Bernstein 1973 12 p refs Presented at the 2nd AEC Sci. Computer Inform. Exchange Meeting, New York, 2 May 1974 Sponsored by AEC
(BNL-18772; Conf-740512-6) Avail: NTIS HC $3.25

A group of intelligent remote graphics terminals forming a network for crystallographic computing is reported. The terminals provide high resolution interactive graphics with batch mode access to the central facility via dial-up voice grade lines. They are used for the determination of molecular structures from X-ray and neutron diffraction data. Author (GRA)

N75-10717# Florence Univ. (Italy).
A STUDY ON DATA-COMPRESSION TECHNIQUES
V. Cappellini, F. Lotti, C. Ori, G. Pasquini, and F. Pieralli Paris ESRO Apr. 1974 430 p refs
(Contract ESTEC-902/70)
(ESRO-CR-93) Avail: NTIS HC $11.25

A study of compression techniques as applied to satellite telemetry data is described. Selected compression techniques are programmed in FORTRAN 4, and input data test sets are constructed from real telemetry tapes of the ESRO-1 and ESRO-2 satellites. The techniques tested are objectively evaluated in terms of achieved compression ratio and, peak and r.m.s. error between original and reconstructed data. A comparison is made of the efficiency of the compression techniques with respect to the six different data classes into which the test sets are classified. Author (ESRO)

N75-10718# Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
TRIAD COMPUTER
J. A. Perschy and B. M. Elder Aug. 1973 175 p refs
(Contract N00017-72-C-4401)
(AD-784372; APL-TG-1212) Avail: NTIS CSCL 09/2

The Triad computer is a third-generation, general purpose, ground programmable digital computer used in the Triad satellite as a real-time controller operating under a priority interrupt system. It consists of a data processor, a memory section, and a power processor. The data processor uses standard and medium scale TTL integrated circuits on high density multilayer boards. The memory section, with a cycle time of 2.4 microsec consists of a 4K-word-by-16-bit aerospace memory stack and hybrid circuitry for address selection and digit sensing, plus a read-only memory containing a bootstrap loader program. The power processor provides power storage plus power level selection under program control. (Modified author abstract) GRA

N75-10719# Honeywell, Inc., St. Petersburg, Fla. Aerospace Div.
COMPUTER FUNCTIONAL REQUIREMENTS STUDY, VOLUME 1 Final Report, Jun. 1971 - Sep. 1973
Ronald G. Blake, Floyd D. Johnson, Gerald F. Muething, Patrick R. Nugent, and Andrew J. Perlowski May 1974 168 p
(Contract F04701-71-C-0327)
(AD-782078/0; SAMSO-TR-74-51-Vol-1) Avail: NTIS HC $6.25 CSCL 17/7

The objective of this study was to assess advanced guidance system computer requirements and functionally define a computer architecture meeting these requirements while incorporating the advances being made in hardware technology, software utilization, and system organization. This report documents the results of that study and presents a functional design capable of meeting the postulated requirements of the 1975-1980 time frame. This document consists of three separate volumes. Volume 1 contains computer functional requirements study design rationale, system concepts, and detailed functional design descriptions of all system elements. GRA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N75-10720# Bureau of Mines, Denver, Colo. Mining Research Center.
COMPUTER PROGRAM FOR NONLINEAR REGRESSION USING LEAST SQUARES
Robert T. Langland and Norman N. Yabe 1974 54 p refs
(BM-IC-8649) Avail: NTIS HC $4.25

A computer program was developed to solve nonlinear regression problems. The program is written in a general form so that, regardless of the functional relationship assumed, the unknown parameters may be evaluated by the Newton-Raphson method of iteration. Variances and covariances of the parameters are derived, based on the propagation of errors. A creep function is established from shale test data as an example of program utility. Program accuracy is compared to the accuracies of other programs in present day use. Author

N75-10721*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
A COMMUNICATION LINK BETWEEN THE GIM DATA BASE AND A GENERAL APPLICATION PROGRAM
W. V. Argo Jun. 1972 5 p
(Contract NAS9-12200)
(NASA-CR-140304; LEC-TM-642-508) Avail: NTIS HC $3.25 CSCL 09B

Utilizing the extract verb of GIM causes the requested information to be extracted from the GIM base and written on to tape. When the GIM extract has completed, a FORTRAN program is then compiled and executed. This program reads the tape generated by GIM, formats and prints the extracted data on the line printer. When an end of file on the extracted tape is encountered the job is terminated. Author

N75-10722*# Cornell Univ., Ithaca, N.Y. Center for Radiophysics and Space Research.
USING THE OCS COMPLOT DP-1 PLOTTER
Lawrence H. Wasserman Jun. 1974 40 p
(Grant NGR-33-010-082)
(NASA-CR-140602; CRSR-580) Avail: NTIS HC $3.75 CSCL 09B

External aspects of using the plotter and general descriptions of the FORTRAN subroutines for generating plotter word groups as punched output, are reported. G.G.

N75-10723# Royal Aircraft Establishment, Farnborough (England).
FURTHER WORK ON THE INTEGRATION OF CLOSED LOOPS SPECIFIED ONLY AS DISCRETE DATA POINTS
D. S. Woodward Apr. 1974 65 p refs
(RAE-TR-73177; BR40651) Avail: NTIS HC $4.25

Construction and use of FORTRAN subroutine for evaluating the area and first moment of a closed loop are described. The subroutine was used extensively for evaluating forces on airfoils from surface pressure distribution measurements. This general subroutine fits simple curves to complex discrete coordinate data for a closed loop. Author (ESRO)

N75-10724# National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computing.
TWO FORTRAN CONTOURING ROUTINES
B. R. Heap 13 May 1974 28 p refs

(NPL-NAC-47) Avail: NTIS HC $3.75

FORTRAN versions of two contouring algorithms previously published in ALGOL 60 are described. They are both for contouring when surface heights are given at the points of a rectangular mesh. In both cases each contour in turn is traced through the mesh, the points where it crosses the mesh lines being found using inverse linear interpolation. In the second and more elaborate method additional points are found on the mesh diagonals after the surface height at the center of each mesh rectangle has been calculated as the average of the heights at the corners of the rectangle. This also resolves any ambiguity as to which way the contour turns while it is being traced. Implementations are given in ANSI FORTRAN with detailed comments.

Author (ESRO)

62 COMPUTER SYSTEMS

Includes computer networks.

N75-10725# Defence Scientific Information Service, Ottawa (Ontario).

IMPLEMENTATION OF A MINI-COMPUTER BASED INFORMATION SYSTEM. PART 1: SYSTEM OVERVIEW

Robert A. McIvor Aug. 1974 50 p refs

(DSIS-TN-16-Pt-1) Avail: NTIS HC $3.75

An automated processing system for entering bibliographic and project data dealing with scientific and technical information, and for producing document digests, catalogue cards or microfilm cartridges, and selective dissemination of information (SDI) notices, has been designed and implemented on a minicomputer system. A consolidated patron file was also implemented. The report describes in general terms the programmes which were developed and their interrelations. Examples of the outputs are included.

Author

N75-10726# Los Alamos Scientific Lab., N.Mex.

SET THEORETIC APPROACH TO DATA TYPE EXTENSION

J. B. Morris and M. B. Wells 1973 15 p refs Presented at the Symp. on Very High Level Languages, Santa Monica, Calif., 28 Mar. 1974 Sponsored by AEC

(LA-UR-73-1287) Avail: NTIS HC $3.25

The approach to defining new data types in Madcap 6 is through set theory. Utilizing what amounts to a language within a language, one may construct, in theory, any subset of UNIVERSE (the set of all Madcap values) as the data type of a variable. The result of allowing such declarations allows a unified basis for a wide spectrum of compiler directives. These compiler directives will allow the implementers of such a language to provide a great many tools which will enable a user to become a more effective programmer. These include: (1) range checking of variables; (2) bounds checking of subscripted variable references; (3) classical compile-time type checking; (4) effective generated-code improvement; (5) better documentation and clarity in programs.

Author (NSA)

N75-10727# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.

ALGORITHMS AND LOGICAL NETWORKS Final Report, 1 Jul. 1971 - 30 Jun. 1974

Peter Elias 29 Jul. 1974 6 p refs

(Contract DAHC04-71-C-0039)

(AD-783426; AROD-10197-5-EL) Avail: NTIS CSCL 09/2

There were two principal problem domains explored under this contract. The first concerns the properties of connecting networks. New results are reported which show that reducing the demand on a connecting network from never blocking to blocking only with very small probability leads to a large reduction in the number of switches required. The second concerns the complexity and efficiency of source coding schemes, including universal schemes. It is shown that a decoder for an efficient source code need never be very complex. It is also noted that there are simple coding procedures for infinite sets like the integers, whose efficiency is good no matter what the distribution of probabilities of source symbols is.

GRA

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support*.

N75-10728# Siemens A.G., Munich (West Germany).

COHERENT OPTICAL FILTERING METHODS IN THE OBJECT AND SPACE FREQUENCY DOMAIN (EXPERIMENTS, THEORY AND CRITICAL CONSIDERATIONS FOR APPLICATION IN THE FIELDS OF CHARACTER READING AND PATTERN RECOGNITION) [KOHAERENT-OPTISCHE MASKEN- UND RAUMFREQUENZFILTERVERFAHREN (EXPERIMENTELLE UND THEORETISCHE UNTERSUCHUNGEN SOWIE KRITISCHE BETRACHTUNGEN DER ANWENDBARKEIT DIESER VERFAHREN FUER DIE ZEICHEN- UND MUSTERERKENNUNG)]

Gerhard Winzer, Nikolaos Douklias, Ida Kachel, Hans-Peter Kraft, Joseph Shamir, and Helmut Stirner Bonn Bundesmin. fuer Forsch. und Technol. May 1974 288 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.

(BMFT-FB-T-74-08) Avail: NTIS HC $8.75; ZLDI, Munich 58.60 DM

The results of several years' research into the recognition of characters and patterns by means of coherent-optical correlators and processors are surveyed. Tests involving the automatic reading of alphanumerical characters, the classification of fingerprints, EEG analysis, and the detection of faults in IC photomasks are discussed. The effect of character defects and twists and of the filter characteristic on the magnitude and shape of the correlation signals was examined both theoretically and experimentally. Improving the simple Vander-Lugt filter to form a multichannel filter with specially adapted subfilters and feature filters increased the systems flexibility.

Author (ESRO)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N75-10729 Rice Univ., Houston, Tex.

UNIFIED APPROACH TO QUADRATICALLY CONVERGENT ALGORITHMS FOR CONSTRAINED FUNCTION MINIMIZATION Ph.D. Thesis

Anil Kumar Aggarwal 1974 65 p

Avail: Univ. Microfilms Order No. 74-21248

The problem of minimizing a function f(x) subject to the constraint phi (x) = 0 is considered, for the case where f is a scalar, x is an n-vector, and phi is an m-vector, where m is less than n. A general quadratically convergent algorithm is presented. The conjugate (-) gradient algorithm and the variable-metric algorithm for constrained function minimization are obtainable as particular cases of the general algorithm. It is shown that, for the case of a quadratic function subject to a linear constraint, all the particular algorithms behave identically if the one-dimensional search for the stepsize is exact. The algorithms are modified so that they can be employed for the case of a nonquadratic function subject to a linear constraint and for the case of a nonquadratic function subject to a nonlinear constraint. Some particular algorithms are tested through several numerical examples.

Dissert. Abstr.

N75-10730*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

SYMBOLIC INTEGRATION OF A CLASS OF ALGEBRAIC FUNCTIONS

Edward W. Ng 15 Oct. 1974 21 p refs

(Contract NAS7-100)

(NASA-CR-140707; JPL-TM-33-713) Avail: NTIS HC $3.25 CSCL 12A

An algorithm is presented for the symbolic integration of a class of algebraic functions. This class consists of functions made up of rational expressions of an integration variable x and square roots of polynomials, trigonometric and hyperbolic functions of x. The algorithm is shown to consist of the following components:

(1) the reduction of input integrands to conical form; (2) intermediate internal representations of integrals; (3) classification of outputs; and (4) reduction and simplification of outputs to well-known functions. Author

N75-10731# Los Alamos Scientific Lab., N.Mex.
ALTERNATING-DIRECTION GALERKIN METHODS FOR PARABOLIC AND HYPERBOLIC PROBLEMS ON RECTANGULAR POLYGONS
J. E. Dendy, Jr. and G. Fairweather Mar. 1974 52 p refs
(Contract W-7405-eng-36)
(LA-5534-MS) Avail: NTIS HC $4.25

Douglas and Dupont have formulated several alternating-direction Galerkin schemes on rectangular regions. It is shown that for certain time-dependent problems on rectangular polygons these schemes can be implemented with no more work than in the rectangular case; in fact the number of arithmetic operations required to complete one time step is O(N), where N is the number of unknowns at each time step. The results extend to systems of nonlinear parabolic equations and to problems on unions of rectangular parallelepipeds. Author (NSA)

N75-10732# Argonne National Lab., Ill.
EMPIRICAL INVESTIGATION OF REORDERING AND DATA MANAGEMENT FOR FINITE ELEMENT SYSTEMS OF EQUATIONS
J. H. Bolstad, G. K. Leaf, A. J. Lindeman, and H. G. Kaper Sep. 1973 51 p refs
(Contract W-7405-eng-38)
(ANL-8056) Avail: NTIS HC $4.25

Certain empirical aspects of the solution of sparse symmetric positive definite systems of linear equations which arise in the approximate solution of second-order elliptic partial differential equations by the finite element method are discussed. The equations are solved using a direct method (LDLT factorization). The structure of the coefficient matrix and the desire to reduce storage and computational requirements necessitate a reordering of the rows (and corresponding reordering of the columns). Author (NSA)

N75-10733# White Sands Missile Range, N.Mex. Data Reduction and Computing Working Group.
PHYSICAL CONSTANTS AND CONVERSION FACTORS
1973 25 p refs
(AD-782701; DR/CWG-126-73) Avail: NTIS CSCL 14/2

The objective of the document is to present a compilation of the more commonly used physical constants, mathematical constants, unit conversion factors and other fixed numerical values as may be required at the various member installations for data processing. GRA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N75-10734# Sheffield Univ. (England). Dept. of Probability and Statistics.
TOPOLOGICAL PROPERTIES OF CHARGE ALGEBRAS
M. BhaskaraRao and K. P. S. BhaskaraRao Oct. 1973 21 p refs
(RR-143/MBR/KPSBR-5) Avail: NTIS HC $3.25 CSCL 12A

The basic problem studied is how far the topological properties of the metric space (A(mu), d sub mu) are reflected in the charge space (omega, A, mu), where A is a field of subsets of omega and mu is a charge on A. Considered are the properties of A and mu that characterize the topological properties of the metric space. G.G.

N75-10735# Northeastern Forest Experiment Station, Upper Darby, Pa.
RELIABLE RESULTS FROM STOCHASTIC SIMULATION MODELS
Donald L. Gochenour, Jr. and Leonard R. Johnson 1973 7 p refs
(USDA-NE-277) Avail: NTIS HC $3.75

Development of a computer simulation model is usually done without fully considering how long the model should run before the results are reliable. However construction of confidence intervals (CI) about critical output parameters from the simulation model makes it possible to determine the point where model results are reliable. Such factors as: (1) Model variability; (2) prescribed width of the CI; and (3) the level of confidence of the simulation model results, have a profound effect on the amount of computer time needed to obtain reliable results. Since proper choice of these parameters can significantly affect the time and cost needed to obtain the results from the model, it is imperative that the user of the model consider these factors. Author

N75-10736*# Appalachian State Univ., Boone, N.C. Dept. of Mathematical Sciences.
AN EMPIRICAL ANALYSIS OF THE DISTRIBUTION OF OVERSHOOTS IN A STATIONARY GAUSSIAN STOCHASTIC PROCESS
Michael C. Carter and Michael W. Madison Jul. 1973 84 p refs
(Contract NAS8-29286)
(NASA-CR-129008; TR-2) Avail: NTIS HC $4.75 CSCL 12A

The frequency distribution of overshoots in a stationary Gaussian stochastic process is analyzed. The primary processes involved in this analysis are computer simulation and statistical estimation. Computer simulation is used to simulate stationary Gaussian stochastic processes that have selected autocorrelation functions. An analysis of the simulation results reveals a frequency distribution for overshoots with a functional dependence on the mean and variance of the process. Statistical estimation is then used to estimate the mean and variance of a process. It is shown that for an autocorrelation function, the mean and the variance for the number of overshoots, a frequency distribution for overshoots can be estimated. Author

N75-10737# Aeronautical Research Labs., Melbourne (Australia).
OPTIMAL CONFIDENCE INTERVALS FOR THE STANDARD DEVIATION OF A NORMAL DISTRIBUTION
Beryl I. Green and G. S. Jost Apr. 1974 15 p refs
(ARL/SM-Note-406) Avail: NTIS HC $3.25

An analysis of the one degree of freedom case to show confidence intervals for variances estimated from samples drawn from normal populations was conducted. The subjects discussed are: (1) equal tail areas confidence limits, (2) shortest unbiased confidence limits and those of minimum length, (3) influence of degrees of freedom on confidence limit percentage points, and (4) comparison of equal tail areas intervals with the alternatives. Author

N75-10738# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
METHODS OF INVESTIGATION FOR MANUAL CONTROL PROCESSES [BEITRAEGE ZU UNTERSUCHUNGSMETHODEN FUER MANUELLE REGELVORGAENGE]
W. Stein Dec. 1973 119 p refs in GERMAN; ENGLISH summary
(FB-15) Avail: NTIS HC $5.25; Forschungsinst. fuer Anthropotech., Meckenheim, West Ger. 10 DM

A synthesis of various known system and signal describing techniques was deduced mathematically and tested experimentally. Mathematical system theory treatments such as correlation techniques and parameter optimization by means of the gradient method were applied to manual control problems. Under the condition of band-limited stochastic inputs, an extensive description is given of the time and frequency domain of variables and functions. Statistical linearization was used to represent certain time-variant and nonlinear properties of transfer systems. Formulas are proposed to assess a broad range of error effects including system properties, forcing function properties, measuring durations, conversion errors, and interactions of these. Author (ESRO)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N75-10739 Maryland Univ., College Park.
QUADRATIC DIFFERENTIAL SYSTEMS: A STUDY IN NONLINEAR SYSTEMS THEORY Ph.D. Thesis
Morris Frayman 1974 202 p
Avail: Univ. Microfilms Order No. 74-22226

The class of nonlinear systems that are described by quadratic differential equations with constant coefficients were studied. These equations are applied in a diversity of natural and socio-element problems. Several techniques for solving quadratic equations are considered, and a class of quadratic equations is defined, whose solution trajectories coincide with those of linear systems. The matrix riccati equation is used to find the solution to another class of quadratic equations. Stability properties of quadratic equations are considered along with a mechanism that prevents quadratic systems from being controllable. Hyperplanes are shown to exist that separate the state space of the equation such that no state can penetrate the hyperplane barrier. The architecture of hyperplane barriers in linearly controllable systems was studied. It is proven that the normals to these barriers must be linearly indepedent, and that there exist invariant manifolds, other than the hyperplane barriers, in linearly controllable quadratic systems. Dissert. Abstr.

N75-10740 Wisconsin Univ., Madison.
MODULE LEVEL DIAGNOSIS OF COMBINATIONAL NETWORKS Ph.D. Thesis
Ramachendra Prahlada Batni 1974 331 p
Avail: Univ. Microfilms Order No. 74-16191

A method is presented for the module level diagnosis of combinational networks by using catalogued module test sets in the network environment under the assumption that there exists at most one faulty module in the network. Initially, single-output combinational networks which have no intermodular feed back and which are composed of only single-output irredundant modules are considered. Design modifications to the network that are sufficient to enable the use of catalogued module tests are determined by analyzing a structural-functional model of the network, which represents the module level network structure and the module functions. The modifications are incorporated by inserting modules with special properties into certain intermodular lines of the network. It is then proved that for every module of the modified network it is possible to apply all input patterns to the module inputs and simultaneously sensitize any single path from the module output to the network output. Dissert. Abstr.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N75-10741*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INVESTIGATION OF RANK 2 AND HIGHER OUTPUT FEEDBACK FOR POLE PLACEMENT
Banavar Sridhar Sep. 1974 19 p refs
(NASA-TM-X-62385) Avail: NTIS HC $3.25 CSCL 12A

A common feature of several pole placement techniques is discussed and the use of a dyadic feedback matrix is presented. The limitation of this design is examined and a design involving output feedback matrices of Rank greater than one is developed as a logical extension of the dyadic feedback design. An example is presented to illustrate the design procedure. Author

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N75-10742 California Univ., Los Angeles.
HIGH FREQUENCY ELECTROMAGNETIC WAVE BACK-SCATTERING FROM RADIALLY INHOMOGENEOUS DIELECTRIC SPHERES Ph.D. Thesis
Avail: Univ. Microfilms Order No. 74-20266

The high frequency, far field, backscattering of a plane, time harmonic, monochromatic, electromagnetic wave by a radially inhomogeneous dielectric sphere is discussed. The sphere was assumed to have an index of refraction n(r) as a function of the radius r which varies according to a specific relation. The two parameters may be varied at will in order to study the effect of inhomogeneous media on backscattering. To obtain an asymptotic solution from the exact solution which is valid at high frequencies, a Watson transformation was performed. Asymptotic expressions were developed from the exact solution for the ray optics contributions postulated by geometric optics. The Watson transformation also yielded results for the surface wave terms. The results indicate that the backscattered rainbow rays were the strongest contributions, followed by the glory rays. Front axial rays, and partial surface waves were also important. Dissert. Abstr.

N75-10743 Moscow State Univ. (USSR).
PHYSICAL PRACTICUM ON ELECTROMAGNETIC FIELDS
L. P. Strelkova 1974 96 p refs In RUSSIAN
Copyright. Avail: Issuing Activity

A manual is presented for the study of a electromagnetic waves, electrodynamics, wave theory, radiotechnology, optics, and wave propagation. Thirteen physics problems are presented, by which the qualitative and quantitative patterns of electromagnetic waves are defined. A description is given of technical data, and the procedure for making measurements and observations. The practicum is based on 3 cm technology, which permits the observation of electromagnetic waves at distances equal to those of long-wave electromagnetics. Author

N75-10744*# Linguistic Systems, Inc., Cambridge, Mass.
INFRARED FILTERS
N. A. Borisevich, V. G. Vereshchagin, and M. A. Validov Washington NASA Aug. 1974 226 p refs Transl. into ENGLISH of the book "Infrakrasnyye Filtry" Minsk, Nauka i Tekhnika Press, 1971 228 p
(Contract NASw-2482)
(NASA-TT-F-814) Avail: NTIS HC $7.50 CSCL 17E

Principles involved in the operation of various types of infrared filters are examined, along with their spectral characteristics, and certain structural peculiarities. Each of the six chapters describes a different type of filter including reflecting, absorbent, interference, diffusion, dispersion and combination filters. Author

N75-10745*# Auburn Univ., Ala.
THE 1974 NASA-ASEE SUMMER FACULTY FELLOWSHIP AERONAUTICS AND SPACE RESEARCH PROGRAM
J. Fred OBrien, Jr., Charles O. Jones, and Bobby F. Barfield (Alabama Univ., Tuscaloosa) Sep. 1974 536 p refs Prepared in cooperation with NASA. Marshall Space Flight Center
(Grant NGT-01-003-045)
(NASA-CR-120336) Avail: NTIS HC $12.50 CSCL 05A

Research activities by participants in the fellowship program are documented, and include such topics as: (1) multispectral imagery for detecting southern pine beetle infestations; (2) trajectory optimization techniques for low thrust vehicles; (3) concentration characteristics of a fresnel solar strip reflection concentrator; (4) calabration and reduction of video camera data; (5) fracture mechanics of Cer-Vit glass-ceramic; (6) space shuttle external propellant tank prelaunch heat transfer; (7) holographic interferometric fringes; and (8) atmospheric wind and stress profiles in a two-dimensional internal boundary layer. A.A.D.

N75-10746*# International Business Machines Corp., Gaithersburg, Md. Federal Systems Div.
DEVELOPMENT OF PROGRAMS FOR COMPUTING CHARACTERISTICS OF ULTRAVIOLET RADIATION Final Report Nov. 1971 - Aug. 1972
J. V. Dave Sep. 1972 34 p refs
(Contract NAS5-21680)
(NASA-CR-139134) Avail: NTIS HC $3.75 CSCL 17E

Efficient programs were developed for computing all four characteristics of the radiation scattered by a plane-parallel, turbid, terrestrial atmospheric model. They were developed (FORTRAN 4) and tested on the IBM /360 computers with 2314 direct

200K and 750K bytes depending upon the task. The scattering phase matrix (or function) is expanded in a Fourier series whose number of terms depend upon the zenith angles of the incident and scattered radiations, as well as on the nature of aerosols. A Gauss-Seidel procedure is used for obtaining the numerical solution of the transfer equation. Author

N75-10747# Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
PROPAGATION EFFECTS AT RADIO FREQUENCIES ON SATELLITE NAVIGATION SYSTEMS
V. L. Pisacane and M. M. Feen May 1974 41 p refs
(Contract N00017-72-C-4401)
(AD-784378; APL-TG-1243) Avail: NTIS CSCL 17/7

The report discusses the effects of the neutral and ionized atmosphere on radio frequency signals used in satellite navigation systems. Knowledge of the signal velocity along the transmission path is necessary to properly interpret the navigation measurements. A technique for taking into account the influence of the neutral atmosphere on radio frequency signals is discussed. The algorithm is based on modeling of the refractive index as a function of surface temperature, pressure, and humidity. Several techniques for accounting for the effects of the ionized atmosphere at VHF and UHF are considered. Recent results are presented on the development of corrective algorithms that could be used operationally by navigators. The techniques developed are based on real-time prediction of the atmospheric electron density distribution. Author (GRA)

N75-10748# Naval Research Lab., Washington, D.C.
NRL PROGRESS REPORT, JANUARY 1974
Jan. 1974 83 p refs
(PB-233882/0) Avail: NTIS HC $4.00 Also available from NTIS on subscription $22.50/year domestic, $28.25/year foreign CSCL 05B

Contents: Radar evolution and innovation at NRL; Over-the-Horizon radar in the HF Band; Theory of the low-temperature thermal resistivity in simple metals; Progress notes in acoustics, chemistry, metallurgy, optical materials, optical physics, radar, space science and technology; Papers by NRL staff members; Index of unclassified reports (January-December 1973); Reader service. GRA

N75-10749# Naval Research Lab., Washington, D.C.
NRL PROGRESS REPORT, FEBRUARY 1974
Feb. 1974 61 p refs
(PB-233883/8) Avail: NTIS HC $3.75 Also available from NTIS on subscription $22.50/year domestic, $28.25/year foreign CSCL 05B

Contents: The laboratory for the structure of matter; The glassy state; Progress notes in metallurgy, ocean sciences, optical physics, and radar; Papers by NRL staff members; Patents; Reader service. GRA

N75-10750# University of Southern Calif., Los Angeles. Electronic Sciences Lab.
[RESEARCH IN SOLID STATE, PLASMAS, ELECTRICAL AND BIOMEDICAL ENGINEERING] Semiannual Progress Report, 1 Oct. 1973 - 1 Apr. 1974
Apr. 1974 102 p refs
(Contract F44620-71-C-0067)
(AD-784655; SAPR-19) Avail: NTIS CSCL 20/12

The report presents a summary of the research program in the broad field of electronics conducted during the past six months by the Electronic Sciences Laboratory, University of Southern California. The program includes research in solid state materials, semiconductors and devices, quantum electronics, plasmas, applied electromagnetics, electrical engineering systems to include control, communication, computer and power systems, biomedical engineering and mathematical biosciences. Summary reports for each research project very briefly describe recent progress and publications. (Modified author abstract) GRA

N75-10784 Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
PASSIVE INFRARED SYSTEMS
Donald S. Lowe *In* AGARD Opto-Electronics Sep. 1974 15 p refs (For availability see N75-10774 01-74)

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution.*

N75-10751 Stanford Univ., Calif.
ULTRASONIC ABSORPTION BY PHOSPHOLIPID VESICLES; ACOUSTIC IMPEDANCE MATCHING AND THE DESIGN OF BROADBAND PIEZOELECTRIC TRANSDUCERS Ph.D. Thesis
Jeffrey Harold Goll 1974 193 p
Avail: Univ. Microfilms Order No. 74-20197

Three separate problems were investigated: (1) the ultrasonic absorption by phospholipid vesicles; (2) the design of broadband piezoelectric transducers by means of acoustic impedance matching; and (3) the broadband coupling to high Q electrical resonators by means of an analogous electrical impedance matching scheme. The ultrasonic absorption and velocity of solutions of asolectin vesicles were measured as functions of the temperature, frequency, and concentration. The evidence was consistent with a thermal relaxation mechanism. High efficiency, broadband response of piezoelectric transducers operating with a water load was accomplished by means of multilayer acoustic impedance matching schemes. The voltage transfer function and electrical input impedance are evaluated by means of a computer program. The broadband coupling to high Q electric resonators by means of multiple quarter wave sections of transmission line is treated theoretically. Broader bandwidth, low loss, and low ripple response is predicted for matching schemes utilizing two properly chosen sections of transmission line. . Author

N75-10752*# Kanner (Leo) Associates, Redwood City, Calif.
ACOUSTICAL STUDIES OF SOUND-PRODUCING SANDS
Shoji Dobashi and Takashi Fujita Washington NASA Jun. 1974 23 p refs Transl. into ENGLISH from Oyo butsuri (Tokyo), v. 21, no. 9 p 361-363
(Contract NASw-2481)
(NASA-TT-F-15715) Avail: NTIS HC $3.25 CSCL 20A

Studies were made to discover the reason why sands from the beach at Kotohiki-ga-hama in Amino-cho, Takeno-gun, Kyoto Prefecture, produce sounds upon compression. The sands were found to have grains with a uniform size and with a rounded shape. Experiments revealed that the sound was probably produced because considerable amounts of air contained between the grains of sand were blown out upon compression. Author

N75-10753# Aeronautical Research Labs., Melbourne (Australia).
SOUND FIELD INTENSITIES IN LIQUIDS AND SOLIDS
L. J. Makarucha and I. G. Scott Feb. 1974 20 p refs
(ARL/Met-Note-100) Avail: NTIS HC $3.75

Expressions derived for sound field intensities in fluids were found to be strongly dependent on initial assumptions and approximations. In particular, the traditional approximations accepted in nondestructive tests (NDT) are shown to be based on extremely restrictive initial conditions. Very little work appears to have been done on solids, as it is common practice in NDT simply to apply expressions for fluids. Author

N75-10754# Loughborough Univ. of Technology (England). Dept. of Transport Technology.
SOUND TURBULENCE INTERACTION Final Report
G. H. Hunter Apr. 1974 13 p
(Grant SRC-B/RG/622)
(TT-7404) Avail: NTIS HC $3.25

An effort to obtain quantitative information on the way in which sound is scattered as it propagates through a turbulent fluid is described. The effects of turbulence on sound propagation are summarized and experiments in which acoustic pulses are propagated across the working section of a wind tunnel in open jet are described. The purpose of the computer program is outlined and some of the difficulties experienced in the writing are noted. ESRO

N75-10755# Loughborough Univ. of Technology (England). Dept. of Transport Technology.
A SURVEY OF AIRCRAFT NOISE ANNOYANCE IN AN AREA

OF INVARIANT NOISE TO ELIMINATE THE EFFECTS ON ANNOYANCE OF VARYING NOISE EXPOSURE
R. M. Edwards and J. B. Ollerhead May 1974 71 p refs
(Contract SN/1170/012)
(TT-7405) Avail: NTIS HC $4.25

The large variability in the measurement of human response to aircraft noise is described, and the philosophy behind a social survey designed to eliminate some causes of this variability by considering a small geographical area of constant noise is outlined. Results from the survey show that, so long as effects of aircraft noise are measured by the Guttman Annoyance Scale, there is little point in trying to find an improved noise measurement index. ESRO

N75-10756# Loughborough Univ. of Technology (England). Dept. of Transport Technology.
HIGH SPEED CASCADE NOISE Final Report
D. L. Hawkings and M. V. Lowson May 1974 26 p refs
(Grant SRC-B/RG/0326)
(TT-7406) Avail: NTIS HC $3.75

Theoretical research into the noise generation mechanisms of high speed blade cascades is described. Two simplified models - the two-dimensional supersonic cascade and the unducted open rotor - are described and their treatment and analysis discussed. ESRO

N75-10757# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
ACOUSTIC SCATTERING FROM A SPHERE WITH NON-UNIFORM SURFACE IMPEDANCE
David L. Brungart May 1974 134 p refs
(AF Proj. 7231)
(AD-783805; AMRL-TR-74-49) Avail: NTIS CSCL 06/2

A general mathematical method is presented for computing effective overpressure distribution in the near and far field regions around a sphere with uniform or nonuniform surface acoustic impedance distribution in the presence of a plane acoustic wave, first for impedance distributions which are symmetric about the axis of approach of the incoming plane wave, then for nonsymmetric distributions with proofs of convergence of the solution method being presented for both symmetric and nonsymmetric cases. Numerical examples are computed and presented graphically for rigid spheres, infinitely soft spheres, spheres with uniform finite surface impedance, and spheres with several types of nonuniform impedance distribution. It is concluded that any model designed to reproduce diffraction patterns of the human head should have a partial covering of material with finite surface impedance to account for the effects of the hair on the effective overpressure distribution. (Modified author abstract) GRA

N75-10758# Michigan Univ., Ann Arbor. Dept. of Aerospace Engineering.
CONVERSION OF AN ION-ACOUSTIC WAVE BY COLLISIONS TO A NEUTRAL SOUND WAVE IN A NONHOMOGENEOUS PLASMA Ph.D. Thesis
R. S. B. Ong and C. C. P. Pian May 1974 86 p refs
(Grant AF-AFOSR-2224-72; AF Proj. 9782)
(AD-782099; Rept-010757; AFOSR-74-1137TR) Avail: NTIS CSCL 04/1

The collisional coupling of low frequency ion-acoustic waves and neutral sound waves propagating downward in the ionosphere is investigated. The ionosphere is considered as a nonhomogeneous weakly ionized plasma consisting of electrons, ions and neutrals. The equations of conservation of mass, momentum, and energy of the three species constitute the basic equations for the analysis. The plasma is assumed to be electrically neutral. Collisional energy transfer between the hot electrons and the colder neutrals are taken into account. The coupled differential equations for the wave amplitudes are solved analytically. (Modified author abstract) GRA

N75-10759# TRW Systems Group, Redondo Beach, Calif.
UNDERWATER APPLICATIONS OF ACOUSTO-OPTICAL IMAGING Final Report, 1 Jan. 1972 - 29 Mar. 1974
R. A. Smith and J. H. Cole 29 Mar. 1974 71 p refs
(Contract N00014-72-C-0182; NR Proj. 240-030)
(AD-784419; TRW-AT-SVD-TR-74-7) Avail: NTIS CSCL 17/1

The results of experiments and analyses completed during Phase 2 concerning the performance of the TRW acousto-optical imaging system are presented. The ultimate sensitivity of the system is reviewed from a theoretical viewpoint and it is shown that the theoretical limit for the system is an echo intensity of about -60 db relative to a micro bar. Experiments were carried out substantiating theoretical predictions. Thus system sensitivity is considerably better than earlier believed. Laboratory experiments on resolution and field of view were carried out with an acoustic reflector in place. Resolution somewhat better than twice the theoretical limit was observed. (Modified author abstract) GRA

N75-10760# Texas Univ., Austin. Applied Research Labs. csc csc 17/1
NTC TRACKING DISPLAY
J. John Brady, III 26 Jul. 1974 71 p
(Contract N60921-74-C-0217)
(AD-783961; ARL-TM-74-32) Avail: NTIS

The tracking display, a dedicated processor, has been added to the navigation, tracking, and communication (NTC) system. The tracking sybsystem of the NTC is an acoustic locator of underwater targets. The slant range, the surface bounce range, and two reception delay times are produced by the range and delay processor by measuring the time delay between reception of a target transmitted pulse. The tracking display calculates the horizontal range, bearing, and depth of the target from this data. A description is given of both the hardware and software involved in the computations along with user instructions and schematics. (Modified author abstract) GRA

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N75-10761# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Dynamik verduennter Gase.
SKIMMING OF MOLECULAR BEAMS FROM DIVERGING NON-EQUILIBRIUM GAS JETS
U. Bossel 1974 24 p refs Presented at the 11th Bien. Fluid Dyn. Symp. on Advanced Probl. and Method in Fluid Mech., Kamienny Potok, 3-8 Sep. 1973
(DLR-FB-74-28) Avail: NTIS HC $3.25; DFLVR, Porz, West Ger. 8 DM

The equations for the density of molecular beams generated by skimming techniques are developed and a numerical solution is presented. The formation of molecular beams by skimming techniques has become an accepted technique in all areas, where well-defined monoenergetic flows of atoms or molecules are needed. Common to all applications is the desire to maximize the beam particle density, or flux, without sacrifice of the free molecular behavior of the flow. Obviously, these requirements call for compromises. Additional constraints on the beam properties are imposed by the diverging nature and by the local temperature anisotropy of the high rarefied free jet expansions from which beam molecules are normally extracted. Experimental evidence appears to verify the analytical treatment of the problem. Author (ESRO)

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation*.

N75-10762 Case Western Reserve Univ., Cleveland, Ohio.
ORTHOPOSITRONIUM ANNIHILATION IN LIQUID AND SOLID HELIUM Ph.D. Thesis
James Bernard Smith, Jr. 1974 126 p

Avail: Univ. Microfilms Order No. 74-16526

Lifetime measurements of orthopositronium in liquid and solid helium are reported as a function of pressure and at temperatures of 1.4, 1.7, and 4.2 K. These measurements were performed in order to investigate the structure of the bubble from which the orthopositronium annihilates, the energy barrier for positronium penetration into helium, and the pickoff rate of orthopositronium in helium. The existing theoretical results do not adequately explain our data. Dissert. Abstr.

N75-10763 California Univ., San Diego.
EMISSION AND ABSORPTION LINES OF QSOS AND PROPERTIES OF THE GAS THAT PRODUCES THEM Ph.D. Thesis
Yee-Wha Tung Chan 1974 231 p
Avail: Univ. Microfilms Order No. 74-19605

Details of emission features of 160 QSOs are collected. Based on the available features of 220 objects, a set of average observed equivalent widths is determined for the composite QSO. Electron collisional excitation cross-sections for 33 permitted transitions are calculated by the impact parameter method. Using these and the available cross-sections for the forbidden and semi-forbidden transitions, line emission rates can be calculated. The process of depopulating the metastable levels of the forbidden lines by photon absorptions are discussed. Critical radii, within which this process is important, are calculated for gas optically thin to the ionizing photons. A model of optically thick gas surrounding the ionizing source is generated where the ionizing photons are absorbed by hydrogen, helium and also heavy elements. Dissert. Abstr.

N75-10764# Committee on Science and Astronautics (U. S. House).
ADVANCED NUCLEAR RESEARCH
William G. Wells, Thomas N. Tate, and Patricia Schwartz Washington GPO Oct. 1974 27 p Rept. Prepared by Subcomm. on Aeron. and Space Technol. presented to Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., 9 Oct. 1974
(GPO-41-253) Avail: Subcomm. on Aeron. and Space Technol.

Reviewed are results of nuclear power and propulsion research and their potential benefits for associated technological areas in power generation and power supplies. The high efficiency of nuclear process heat techniques for coal conversion processes, and the application of plasma core reactor research to disposing of radioactive waste products are emphasized. G.G.

N75-10765*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
THE SPIN-TEMPERATURE THEORY OF DYNAMIC NUCLEAR POLARIZATION AND NUCLEAR SPIN-LATTICE RELAXATION
Charles E. Byvik and David S. Wollan Washington Nov. 1974 63 p refs
(NASA-TR-R-427; L-9554) Avail: NTIS HC $4.25 CSCL 20H

A detailed derivation of the equations governing dynamic nuclear polarization (DNP) and nuclear spin lattice relaxation by use of the spin temperature theory has been carried to second order in a perturbation expansion of the density matrix. Nuclear spin diffusion in the rapid diffusion limit and the effects of the coupling of the electron dipole-dipole reservoir (EDDR) with the nuclear spins are incorporated. The complete expression for the dynamic nuclear polarization has been derived and then examined in detail for the limit of well resolved solid effect transitions. Exactly at the solid effect transition peaks, the conventional solid-effect DNP results are obtained, but with EDDR effects on the nuclear relaxation and DNP leakage factor included. Explicit EDDR contributions to DNP are discussed, and a new DNP effect is predicted. Author

N75-10766# Rome Univ. (Italy). Inst. of Physics.
PROFILE AND CONTAMINATION OF AN ELECTRON BEAM
Giorgio Romano 25 Mar. 1974 10 p refs
(Nota-Interna-542) Avail: NTIS HC $3.25

Profile and gamma ray contamination of a high energy electron beam were measured by means of plastic track detectors. The influence of high radiation doses on cellulose nitrate is discussed. ESRO

N75-10767# Rome Univ. (Italy). Inst. of Physics.
MULTICHARGED PARTICLE EMISSION IN THE DISINTEGRATION OF CARBON INDUCED BY HIGH-ENERGY ELECTRONS
Giustina Baroni, Sergio Diliberto, Sergio Petrera, and Giorgio Romano 5 Apr. 1974 23 p refs
(Nota-Interna-555) Avail: NTIS HC $3.25

The disintegration of carbon nuclei (polystyrene foil) by 800 and 1000 MeV electrons was studied using plastic detectors. Angular and energy distributions of the emitted Li, Be and B isotopes are presented. In the absence of a clear theoretical model, the consistency of the results with an isotropic emission by a moving excited nucleus was analyzed. Author (ESRO)

74 OPTICS

Includes light phenomena.

N75-10768 Polytechnic Inst. of Brooklyn, N.Y.
QUASI-OPTICAL METHODS FOR WAVEGUIDES AND RESONATORS Ph.D. Thesis
Leih-Wei Chen 1974 110 p
Avail: Univ. Microfilms Order No. 74-22463

The utility of ray-optical techniques for accurate calculation of scattering by obstacles in free space has been well establish. More recently, these techniques have been extended to accommodate also radiation and scattering in waveguides and ducts. In these waveguide applications, use is made of the ray-optical description of guided modes, and techniques have been developed for the ray-optical calculation of the excitation amplitude of various modes by direct radiation or by radiation from sources induced on scattering objects. In the present study, the ray method is generalized to scattering in waveguides filled with a medium that can propagate two wave species. Dissert. Abstr.

N75-10769 Polytechnic Inst. of Brooklyn, N.Y.
SCATTERING OF OPTICAL BEAMS FROM SLOWLY VARYING LEAKY WAVE STRUCTURES Ph.D. Thesis
Abraham Saad 1974 138 p
Avail: Univ. Microfilms Order No. 74-22496

This work deals with the scattered field due to a bounded beam incident on the upper (planar) surface of a structure whose properties vary slowly along one of the directions parallel to the surface. Representations for the scattered field are developed herein in terms of reflection operators that exhibit a Green's function form. To illustrate the applicability of these operators, several important aspects of both analysis and synthesis are discussed herein, with illustrations being presented for incident bounded beams with uniform and Gaussian profiles. The scattering problem is reduced to three simpler auxiliary problems: (1) Establishing the connection between the local parameters and the geometrical configuration of the structure; (2) determining the response of this structure to a source of the elementary variety, and (3) obtaining the scattered field due to a beam with a prescribed profile. Dissert. Abstr.

N75-10770 Rochester Univ., N.Y.
GRADIENT INDEX OPTICS: ASPECTS OF DESIGN, TESTING, TOLERANCING, AND FABRICATION Ph.D. Thesis
Duncan Thomas Moore 1974 228 p
Avail: Univ. Microfilms Order No. 74-22613

The properties of gradient index optical components were studied. Lens systems composed of materials whose index of refraction varied in a prescribed manner were designed using both third order aberration theory and ray trace analysis. The lenses contained either an axial gradient, where the index varies in the optical axis direction or a radial gradient where the variation is orthogonal to the optical axis. The ray trace was based on a polynomial expansion of the ray path in the gradient index media. Single element collimators with wavefront errors of less than lambda/20 were designed. The equivalence of an aspherical surface and a spherical surface bounded by an axial gradient

was shown in the design of corrector plates for a spherical primary mirror. Tolerancing analysis of the gradient index profile and the effects of its decentration, tilt, and displacement were also studied for these lenses. The index profiles were measured automatically by an instrument that utilized ac interferometry.
Dissert. Abstr.

N75-10771 Pennsylvania State Univ., University Park.
THE INFLUENCE OF SELF-FOCUSING ON THE STIMULATED LINE OF THE RAYLEIGH WING Ph.D. Thesis
Durand Murray Smith 1974 70 p
Avail: Univ. Microfilms Order No. 74-21028

The stimulated line of the Rayleigh wing was studied for nitrobenzene using a focused beam of a Q-switched ruby laser. In particular, the dependence of the frequency shift on the distance of the focus from the entrance of the scattering cell was investigated and confirmed. However, for certain beam parameters, a SLRW was found for which the frequency shift was a constant regardless of the position of the focus in the scattering cell. The latter observation is consistent with the existing theory concerning Rayleigh wing scattering. Furthermore, focal depth dependent frequency shifts of the SLRW of somewhat lower frequency shift than reported by Peterson and Wiggins and the appearance of two lines having characteristics of the SLRW were discovered. Dissert. Abstr.

N75-10772*# Ball Bros. Research Corp., Boulder, Colo.
TEST PROGRAM ON THE CONTAMINATION OF ULTRAVIOLET REGION MIRRORS BY APOLLO TELESCOPE MOUNT MATERIALS Final Report
J. D. Austin 14 Jan. 1974 90 p refs
(Contract NAS8-27996)
(NASA-CR-120516; F74-01) Avail: NTIS HC $4.75 CSCL 20F

Results are presented of testing performed to measure the effects of material outgas products on the reflectances of ultraviolet-region mirrors. These tests were to provide data on changes of ultraviolet reflectances of first-surface mirrors which had been exposed to the outgas products of selected materials under specific time and thermal-vacuum conditions. The requirement for such data was based on the extreme sensitivity of the sophisticated optical instruments in the Skylab mission's Apollo Telescope Mount (ATM) to condensed outgas products from materials, and on the desire to insure that no serious hazard of contaminating these instruments existed. Author

N75-10773*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
OPTICAL TRANSFER FUNCTION OF NTS-1 RETROREFLECTOR ARRAY
David Arnold Oct. 1974 56 p ref
(Grant NGR-09-015-002)
(NASA-CR-140667; RTOP-161-05-02) Avail: NTIS HC $4.25 CSCL 20F

An optical transfer function was computed for the retroreflector array carried by the NTS-1 satellite. Range corrections are presented for extrapolating laser range measurements to the center of mass of the satellite. The gain function of the array was computed for use in estimating laser-echo signal strengths.
Author

N75-10774# Advisory Group for Aerospace Research and Development, Paris (France).
OPTO-ELECTRONICS
Sep. 1974 143 p refs In ENGLISH and FRENCH
(AGARD-LS-71) Avail: NTIS HC $5.75

A study was conducted of the state-of-the-art of electro-optic developments applied to the avionics field of research and development. A review of optics including fiber optical techniques and their exploitation in the avionics field for transmission of information is presented. The capabilities of aircraft using television, low light television, infrared, lasers, and optical methods to sense and display information are analyzed. System designs and problems encountered in applying the sensors are discussed. For individual titles, see N75-10775 through N75-10784.

N75-10775 Ministry of Defence, London (England).
THE IMPACT OF OPTO-ELECTRONICS UPON AVIONICS c06
F. S. Stringer *In* AGARD Opto-Electronics Sep. 1974 2 p
(For availability see N75-10774 01-74)

The military applications of electro-optical equipment are discussed. Emphasis is placed on systems design of sensors and display devices. Specific applications of electro-optic techniques for air navigation, target acquisition, and weapon aiming are examined. The advantages of head-up displays are compared with those of head-down displays. The subjects of fiber optics, optical design, and imaging system techniques are presented. Author

N75-10776 Royal Radar Establishment, Malvern (England).
LASER SOURCES c36
P. A. Forrester *In* AGARD Opto-Electronics Sep. 1974 9 p refs (For availability see N75-10774 01-74)

The basic physics common to all the different types of laser is discussed to include stimulated and spontaneous emission, population inversion, and resonator modes. Methods of controlling the time variation of the output power by the techniques of Q-switching, cavity dumping, and mode locking are described. The properties of some of the currently available laser devices, based on optically-pumped solids, gaseous discharges, and semiconductor diodes, are analyzed. Author

N75-10777 Services Electronics Research Lab., Baldock (England).
INFRARED AND VISIBLE RADIATION DETECTORS FOR IMAGING AND NON-IMAGING APPLICATIONS c35
B. R. Holeman *In* AGARD Opto-Electronics Sep. 1974 16 p refs (For availability see N75-10774 01-74)

A general description of a photodetector is presented and, after defining the relevant parameters to describe its operation, the limits set by the quantum nature of the radiation input are outlined. Bolometric detectors are reviewed with particular reference to triglycine sulphate. Photoconductive, photovoltaic and photoemissive detection processes are compared before describing the wide range of single element detectors utilising these effects. The multielement technique, as shown in thermal infrared detectors such as cadmium-mercury telluride and lead-tin telluride, and in visible and near infrared detectors using silicon photosensitive integrated circuits, is described. The principles of electron beam readout are outlined and devices using this technique, such as vidicons, orthicons and isocons are reviewed. Finally, the state of the art in an alternative solid state approach, charge coupled transfer, is discussed. Author

N75-10778 Hughes Aircraft Co., Culver City, Calif. Display Systems Lab.
DISPLAY DEVICES AND THEIR USE IN AVIONICS SYSTEMS c06
G. K. Slocum *In* AGARD Opto-Electronics Sep. 1974 14 p
(For availability see N75-10774 01-74)

The factors which affect the selection of a display for imaging sensors in avionics systems are discussed. The visual characteristics of the observer and the specific task to be accomplished are examined to show the impact on sensor selection. The factors affecting the performance of the operator are examined and the display design requirements are developed. The following systems are analyzed: (1) scan converter tubes, (2) digital scan converter, (3) television frame rate display devices, (4) helmet mounted displays, (5) plasma panel pictorial display, (6) light emitting diode array pictorial display, (7) electroluminescent matrix panel pictorial display, and (8) liquid crystal matrix pictorial display.
Author

N75-10779 Plessey Radar Ltd., Havant (England). Plessey Radar Research Centre.
OPTICAL WAVEGUIDE DATA TRANSMISSION FOR AVIONICS
David A. Kahn *In* AGARD Opto-Electronics Sep. 1974 22 p refs (For availability see N75-10774 01-74)

Optical communications and waveguide communications with special reference to optical frequencies are considered. A review of optical waveguides with emphasis on materials, structures, drive circuits, photodiodes and avalanche diodes, low noise amplification, and the waveguide/terminal interface is presented. Transmitting and receiving terminals are described to include

examinations of lasers, light emitting diodes, drive circuits, photodiodes and avalanche diodes, low noise amplification, and the waveguide/terminal interface. Various system engineering aspects are examined to include powering arrangements, cableform, and multiplexing techniques. Author

N75-10780 Smiths Industries Ltd., Bishops Cleeve (England). Aviation Div.
HEAD-UP DISPLAY OPTICS
R. A. Chorley *In* AGARD Opto-Electronics Sep. 1974 18 p (For availability see N75-10774 01-74)

The factors which influence the definition of the optical system for a Head-Up Display are defined. The conflicting requirements for wide fields of view and compact, easily installed hardware are discussed (with relation to both refractive and reflective optical systems) together with various aspects of optical performance which influence the overall display system performance. The primary reason for installing a HUD system in a military aircraft is the improved weapon-aiming capability it can provide. From this point of view the HUD can be looked upon as a sophisticated descendant of the various forms of optical gunsight which have been in service for a quarter of a century or more. Thus the most basic requirement for a military HUD system is that it should provide the information needed for weapon aiming, and this means that it must provide an aiming symbology display, focussed nominally at infinity, so that the pilot can correlate and utilize the display and the outside world information simultaneously. Author

N75-10781 Optical Industries N. V., Delft (Netherlands).
OPTICS FOR PASSIVE VIEWING DEVICES
J. Becker *In* AGARD Opto-Electronics Sep. 1974 7 p refs (For availability see N75-10774 01-74)

The uses of far infrared detectors for image intensification and low light visibility are discussed. Specific applications of low light level instruments with electron optical intensification of the brightness in astronomy and high speed photography, in industry for non destructive testing by X-ray imaging, in the medical field, and in military situations for passive detection or reconnaissance at night are described. Non scanning thermal infrared devices and systems scanning in the image space of the front optics which operate on the long wave infrared spectrum are analyzed. Photographs and illustrations of typical optical devices are provided. Author

N75-10782 Service Technique des Telecommunications de l'Air, Paris (France).
PRINCIPLE AND REALIZATION OF AERONAUTICAL LASER SYSTEMS [PRINCIPE ET REALISATION DES SYSTEMES LASER EN AERONAUTIQUE] **c36**
Patrice Mollie and Francois Chabannes (Lab. Central de l'Armement) *In* AGARD Opto-Electronics Sep. 1974 21 p refs In FRENCH; ENGLISH summary (For availability see N75-10774 01-74)

Various typical aeronautical laser systems are described. The effects of various parameters on the design of laser systems are analyzed. Specific applications for range finding, guidance, detection, surveillance, and gyroscopes are examined. Diagrams are provided to show the methods of operating in the active, semi-active, and passive modes for target acquisition and remote control. Author

N75-10783 Royal Aircraft Establishment, Farnborough (England).
LOW LIGHT TELEVISION SYSTEMS
R. J. Corps *In* AGARD Opto-Electronics Sep. 1974 12 p refs (For availability see N75-10774 01-74)

The component parts which constitute a low light level television system are described. The advantages and disadvantages of each unit are analyzed. The characteristics and applications of five specific television systems are examined. The possibility of using active illumination with a gated television system is proposed. Diagrams of the components are provided to show their construction and operation. The components include the following: (1) cascade image intensifier, (2) motion compensated intensifier with gating, (3) channel plate intensifier, (4) proximity diode image intensifier, and (5) image orthicons. Author

N75-10784 Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
PASSIVE INFRARED SYSTEMS **c70**
Donald S. Lowe *In* AGARD Opto-Electronics Sep. 1974 15 p refs (For availability see N75-10774 01-74)

Blackbody emission and the nature and characteristics of radiation from targets and backgrounds are discussed. The effect of the atmosphere on the detection process is reviewed. The functions of the components found in optical systems are described. The radiation transfer from the target through the atmosphere and the optical system is developed. Concepts and principles used in designing various types of sensors are analyzed with emphasis placed on trackers and airborne scanners. Author

N75-10785*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SOME ASPECTS OF OPTICAL FEEDBACK WITH CADMIUM SULFIDE AND RELATED PHOTOCONDUCTORS
Stephen J. Katzberg Washington Nov. 1974 38 p refs (NASA-TN-D-7727; L-9634) Avail: NTIS HC $3.75 CSCL 20F

A primary limitation of many solid state photoconductors used in electro-optical systems is their slow response in converting varying light intensities into electrical signals. An optical feedback technique is presented which can extend the frequency response of systems that use these detectors by orders of magnitude without adversely affecting overall signal-to-noise ratio performance. The technique is analyzed to predict the improvement possible and a system is implemented using cadmium sulfide to demonstrate the effectiveness of the technique and the validity of the analysis. Author

N75-10786*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A TECHNIQUE FOR DISPLAYING FLIGHT INFORMATION IN THE FIELD OF VIEW OF BINOCULARS FOR USE BY THE PILOTS OF RADIO CONTROLLED MODELS
Harry V. Fuller Sep. 1974 17 p
(NASA-TM-X-72015) Avail: NTIS HC $3.25 CSCL 20F

A display system was developed to provide flight information to the ground based pilots of radio controlled models used in flight research programs. The display system utilizes data received by telemetry from the model, and presents the information numerically in the field of view of the binoculars used by the pilots. Author

N75-10787# Sandia Labs., Albuquerque, N.Mex.
IMAGE ENHANCEMENT TECHNIQUES: ELECTRON MICROPROBE EXPERIMENT
H. D. Jones Mar. 1974 25 p refs Sponsored by AEC
(SLL-73-292) Avail: NTIS HC $3.25

Image enhancement techniques are applied in the processing of Mariner photographs, in the fields of optical holography, and nondestructive testing (e.g., acoustical holography. The theory behind image enhancement techniques is reviewed, and is applied to electron microprobe data. A computer program is presented to process and display digital data in image form. NSA

N75-10788# Siemens A.G., Munich (West Germany). Forschungslab.
ELECTRON ENERGY LOSS SPECTROMETRY [ELEKTRONEN-ENERGIE-VERLUST-SPEKTROMETRIE]
Walter Kraus Bonn Bundesmin. fuer Forsch. und Technol. May 1974 33 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-T-74-06) Avail: NTIS HC $3.75; ZLDI, Munich 6.60 DM

Electrons interacting with matter can undergo energy losses characteristic for the kind of matter concerned. The characteristic losses should be usable for microanalysis, especially of light elements. The equipment for electron energy loss spectrometry essentially consists of the electron optical column and of the spectrometer. 40 to 100 kV electrons penetrate the specimen. Part of them suffers energy losses, which are examined by an retarding potential analyzer. A multichannel analyzer used as multiscaler controls the process by means of an optoelectronic

signal transmitting line and stores the pulses sent from the detector along the transmitting line. Author (ESRO)

N75-10789# Army Foreign Science and Technology Center, Charlottesville, Va.
COMMUTABLE FUNCTIONAL DEVICES OF THE SCANISTOR TYPE IN SYSTEMS OF OPTOELECTRONIC INFORMATION PROCESSING
K. F. Berkovskaya and B. G. Podplaskin 12 Apr. 1974 27 p refs Transl. into ENGLISH from Mikroelektronika (USSR), v. 5, no. 1, 1972 p 48-65
(AD-783820; FSTC-HT-23-466-74) Avail: NTIS CSCL 20/6
The status of multielement optrons among optical data processing systems is described. One possible variant of an active optron is presented, based on solid-state matrices or panels with distributed parameters, of the emitting and photosensing types. The precision of analog-to-discrete conversion with a scanistor will depend mainly on the number of elementary cells N. GRA

N75-10790# Ballistic Research Labs., Aberdeen Proving Ground, Md.
LIGHT REFRACTION BY MEAN TEMPERATURE GRADIENTS IN THE NEAR-EARTH ATMOSPHERE Final Report
Marvin L. Wesely and Charles R. Stearns Jun. 1974 42 p refs
(AD-783484; BRL-MR-2386) Avail: NTIS CSCL 20/6
Visible light ray paths in the atmospheric surface layer are numerically computed by division of 500- to 5000-m ranges into small intervals so that the ray path height and thus the refractive index gradient is nearly constant for each step. Meteorological conditions are varied by using different combinations of sensible heat fluxes, surface stresses, and surface roughness. Although the effect of water vapor gradients can be substantial, their effect is not included here. The results are confined to heights less than five m because of the restrictive values chosen for the ratio of the eddy diffusivity of heat to that of momentum. Mirages hide lower portions of images and the minimum observable height varies approximately in inverse proportion to the observer height. (Modified author abstract) GRA

N75-10791# Arizona Univ., Tucson. Optical Sciences Center.
DEVELOPMENT AND ASTRONOMICAL APPLICATION OF A HIGH QUANTUM EFFICIENCY INFRARED UPCONVERTER Final Report, Aug. 1971 - Aug. 1972
T. R. Gurski Jun. 1974 149 p refs Sponsored by NASA
(Contract F04695-67-C-0197)
(NASA-CR-140679; SAMSO-TR-73-85-Vol-2; AD-781340) Avail: NTIS HC $5.75 CSCL 17/5
The report describes the state of upconverter development, develops the theory of upconversion to a point where it can be compared with experimental results, and treats the many practical factors involved in the successful operation of an upconverter. Special attention is given to the description of a pump light feedback technique that considerably improves the quantum efficiency of the upconversion process. Experimental laboratory results are presented. Most significant among them is the achievement of quantum conversion efficiency much higher than previously reported. The experimental results also suggest the practicality of the upconverter spectrometer. Successful astronomical tests of the upconverter are described. These results are the first IR detections of astronomical objects by an upconverter. GRA

N75-10792# Naval Postgraduate School, Monterey, Calif.
AN EXPERIMENT TO MEASURE THE MODULATION TRANSFER FUNCTION OF THE ATMOSPHERE IN THE MARINE BOUNDARY LAYER M.S. Thesis
Marion Romaine Alexander, Jr. Jun. 1974 66 p refs
(AD-783807) Avail: NTIS CSCL 20/6
A system to measure the modulation transfer function (MTF) of the atmosphere over the ocean has been designed, constructed, and tested. The apparatus employs a high resolution scanning telescope with the capability for use in a broad range of visual and infrared wavelengths. Two successful trials were conducted with a gyro-stabilized 6328 A laser mounted on board the R. V. ACANIA. The propagation path was approximately one km over open water from the ACANIA to Point Pinos. Two more successful trials were conducted with a 6328 A laser and a 10.6 micrometer laser propagating simultaneously from shore to shore across 4 km of the southern end of Monterey Bay. Data was processed using fast Fourier transform methods. The MTF of the atmosphere for 6328 A light was measured. Author (GRA)

N75-10793# Polytechnic Inst. of Brooklyn, N.Y. Dept. of Electrical Engineering and Electrophysics.
A STUDY OF BEAM COUPLERS FOR INTEGRATED OPTICS Annual Report
Theodor Tamir Mar. 1974 19 p refs
(Contract N00014-67-A-0438-0014; NR Proj. 009-007)
(AD-784514; PINY-EE/EP-74-138) Avail: NTIS CSCL 20/6
The research program represents a theoretical investigation of generalized beam couplers for integrated-optics applications. Three distinct investigations were considered: (1) The scattering of a bounded beam by a planar structure whose properties vary along a longitudinal direction; (2) The practical realization of thin-film structures with desired variation of their properties along a longitudinal direction; and (3) The determination of the specific longitudinal variation required to produce a desired beam function. GRA

N75-10794# Arizona Univ., Tucson. Optical Sciences Center.
APPLIED OPTICS RESEARCH REPORT Semiannual Report, 1 Oct. - 31 Dec. 1973
15 Jan. 1974 28 p refs
(Contract F04695-67-C-0197)
(AD-784229; SAMSO-TR-74-115) Avail: NTIS CSCL 20/6
This Semiannual FY74 status report of the University of Arizona Optical Sciences Center presents the results of work and statements of research and academic direction in program areas supported entirely or in part by USAF Contract. Other activities being carried on at the same time are also described. Specifically covered or referenced are psychophysical experimentation, quantum optics, restoring methods, and thermal expansion measurements. Author (GRA)

N75-10795# Arizona Univ., Tucson. Optical Sciences Center.
APPLIED OPTICS RESEARCH REPORT Quarterly Report, 1 Jan. - 31 Mar. 1974
P. A. Franken Apr. 1974 31 p refs
(Contract F04695-67-C-0197)
(AD-784228; SAMSO-TR-74-133; QR-3) Avail: NTIS CSCL 09/2
This 3rd Quarter FY74 status report of the University of Arizona Optical Sciences Center presents results of work in program areas supported entirely or in part by USAF Contract. Specifically covered in this report are automated pattern recognition, digital image manipulation and information extraction, computer image analysis, electroencephalographic evaluation of image quality, theoretical optics (holographic gratings, and study of speckled patterns from phase diffusers), and quantum optics (transient interactions). A list of publications completed during the reporting period is included. Author (GRA)

N75-10796# Army Foreign Science and Technology Center, Charlottesville, Va.
MECHANICAL OSCILLATOR IN A LUMINOUS FLUX
V. B. Braginskii, V. A. Kuznetsov, and V. N. Rudenko 26 Apr. 1974 9 p refs Transl. into ENGLISH from Vestn. Moscow Univ. (USSR), no. 2, 1971 p 192-197
(AD-783760; FSTC-HT-23-2288-72) Avail: NTIS CSCL 14/2
An experimental study was made of the effects of luminous rigidity and radiometric oscillatory instability. High sensitivity when measuring small forces (or moments of forces) in macroscopic experiments can be attained if the dissipative coupling between the probe body and the laboratory is appreciably reduced. When high-Q mechanical oscillators are built and placed in a vacuum, effects are induced that strongly affect the dynamic characteristics of these oscillators. The present report deals with two of these effects. GRA

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N75-10797 Stanford Univ., Calif.
LOW-FREQUENCY INSTABILITIES AND PLASMA TURBULENCE Ph.D. Thesis
Dragan Ilic 1973 140 p
Avail: Univ. Microfilms Order No. 74-6489

A theoretical and experimental study was conducted of steady-state and time-dependent characteristics of the positive column and the hollow cathode discharge (HCD). It forms part of a wider program on plasma turbulence. The steady state of a non-isothermal, cylindrical positive column in an axial magnetic field is described by three moment equations in the plasma approximation. Volume generation of electron-ion pairs by single-stage ionization, the presence of axial current, and collisions with neutrals are considered. The theory covers the range from the low pressure, collisionless regime to the intermediate pressure, collisional regime. It yields radial profiles of the chagred particle velocities, density, potential, electron and ion temperatures, and demonstrates similarity laws for the positive column. The results are compared with two moment theories and with experimental data on He, Ar and Hg found in the literature for a wide range of pressures. A simple generalization of the isothermal theory for an infinitely long cylinder in an axial magnetic field to the case of a finite column with axial current flow is also demonstrated. Dissert. Abstr.

N75-10798*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ION HEATING IN A PLASMA FOCUS
Frank Hohl and S. Peter Gary (College of William and Mary) Washington Nov. 1974 30 p refs
(NASA-TN-D-7765; L-9767) Avail: NTIS HC $3.75 CSCL 20I

Ion acceleration and heating in a plasma focus were investigated by the numerical integration of the three-dimensional equations of motion. The electric and magnetic fields given were derived from experimental data. The results obtained show that during the collapse phase of focus formation, ions are efficiently heated to temperatures of several keV. During the phase of rapid current reduction, ions are accelerated to large velocities in the axial direction. The results obtained with the model are in general agreement with experimental results. Author

N75-10799*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MAGNETOGASDYNAMIC COMPRESSION OF A COAXIAL PLASMA ACCELERATOR FLOW FOR MICROMETEOROID SIMULATION
E. B. Igenbergs and E. L. Shriver Washington Oct. 1974 64 p refs
(NASA-TR-R-435; M-465) Avail: NTIS HC $4.25 CSCL 20I

A new configuration of a coaxial plasma accelerator with self-energized magnetic compressor coil attached is described. It is shown that the circuit may be treated theoretically by analyzing an equivalent circuit mesh. The results obtained from the theoretical analysis compare favorably with the results measured experimentally. Using this accelerator configuration, glass beads of 125 micron diameter were accelerated to velocities as high as 11 kilometers per second, while 700 micron diameter glass beads were accelerated to velocities as high as 5 kilometers per second. The velocities are within the hypervelocity regime of meteoroids. Author

N75-10800# Pennsylvania State Univ., University Park. Ionosphere Research Lab.
TURBULENT MAGNETIC FIELDS IN A COLLISION DOMINATED PLASMA
Robert T. McGrath 14 Oct. 1974 73 p refs
(Grant NSF GA-33446X1)
(PSU-IRL-SCI-432; SR-432) Avail: NTIS HC $4.25

In a recent study on stationary, homogeneous turbulence of magnetic fields interacting with a collision dominated plasma, two coupled, second order, homogeneous differential equations were obtained for the time dependence of the scalar amplitudes of the Fourier transforms of the two point correlation functions. It is shown that the relaxation of constraint on the collision frequencies leads to an additional term in the equation for the evolution of the turbulent magnetic field. The resulting equation for the scalar amplitudes of the Fourier transforms of the two point correlation function now contains driving terms proportional to integrals over the Fourier transform of the three point correlation function. These driving terms give rise to particular solutions for the scalar amplitudes of the two point correlation functions; isotropic and non-isotropic solutions are found. Author

N75-10801# Princeton Univ., N.J. Plasma Physics Lab.
PHYSICAL MECHANISM OF PARAMETRIC INSTABILITIES NEAR THE LOWER HYBRID FREQUENCY IN INHOMOGENEOUS PLASMA
Miklos Porkolab Oct. 1974 34 p refs Presented at Symp. on Plasma Heating in Toroidal Devices, Varenna, Italy, Sep. 1974
(Contract AT(11-1)-3073)
(MATT-1069) Avail: NTIS HC $3.75

The dispersion relation for parametric instabilities near the lower hybrid frequency is obtained from model fluid equations. The following instabilities are discussed: Resonant decay into ion sound modes and decay into ion quasi-modes. Strong magnetic field decay into quasi-modes is similar to nonlinear Landau damping in weak turbulence theory. In addition, decay into the purely growing mode and fluid-quasi modes may also occur. The results are compared with recent calculations from the Vlasov equation. Author

N75-10802# Princeton Univ., N.J. Plasma Physics Lab.
RADIATION FROM PLASMAS IN THE ST TOKAMAK
N. Bretz, D. Dimock, A. Greenberger, E. Hinnov, E. Meservey, W. Stodiek, and S. VonGoeler Oct. 1974 10 p refs
(Contract AT(11-1)-3073)
(MATT-1077; IAEA-CN-33/A3-1) Avail: NTIS HC $3.25

Quantitative vacuum ultraviolet (UV) measurements of various ST Tokamak discharges show that the atom density of metal impurities is about 0.1% to 1.5% of electron density and that the atom density of oxygen is about 1% to 10%. These concentrations yield an effective ionic charge consistent with the measured current, voltage, and profiles of electron temperature. The radial distribution of high-Z material is obtained from X-ray measurements. In the extreme UV region strong emission has been observed and attributed to line emission from heavy metal (Fe or Mo) ions which are produced only at electron temperature above about 1200 eV; the very narrow radial profile of observed intensity is consistent with measured temperature and density profiles. Rough estimates of the concentration of heavy metals are consistent with vacuum UV and X-ray data. Author

N75-10803# Princeton Univ., N.J. Plasma Physics Lab.
TRANSPORT AND DIVERTOR STUDIES IN THE FM-1 SPHERATOR
K. Ando, S. Ejima, S. Davis, R. Hawryluk, H. Hsuan, D. M. Meade, M. Okabayashi, N. Sauthoff, J. Schmidt, and J. Sinnis Oct. 1974 16 p refs
(Contract AT(11-1)-3073)
(MATT-1078; IAEA-CN-33/B4-4) Avail: NTIS HC $3.25

Fundamental problems of toroidal fusion devices have been investigated in the FM-1 Spherator. These subjects include the transport due to drift wave turbulence in the trapped electron regime, poloidal divertor and impurities, and lower hybrid heating. Author

N75-10804# Princeton Univ., N.J. Plasma Physics Lab.
THE EFFECTS OF IMPURITIES AND MAGNETIC DIVERTORS ON HIGH-TEMPERATURE TOKAMAKS
D. M. Meade, H. P. Furth, P. H. Rutherford, F. G. P. Seidl, and D. F. Dvechs (Max-Planck Inst. fuer Plasmaphys., Garching, West Germany) Oct. 1974 17 p refs
(Contract AT(11-1)-3073)
(MATT-1079; IAEA-CN-33/A15-4) Avail: NTIS HC $3.25

A one dimensional tokamak plasma transport code has been adapted to include impurity influx, stripping, radiation, and diffusion, as well as the usual processes of hydrogen plasma

and heat transport, recycling at the boundary, and multigeneration charge exchange. Neutral beam heating, adiabatic compression, and divertor boundary conditions are included as optional features. Illustrative computations are given for present day and next generation tokamaks. The problems of impurity control are discussed, and two technical approaches are examined in greater detail: the transient cold plasma shield, and the poloidal divertor. Author

N75-10805# Princeton Univ., N.J. Plasma Physics Lab.
TWO-ENERGY COMPONENT TOROIDAL FUSION DEVICES
H. L. Berk, H. P. Furth, D. L. Jassby, R. M. Kulsrud, C. S. Liu, M. N. Rosenbluth, P. H. Rutherford, F. H. Tenney, T. Johnson, J. Killeen et al Nov. 1974 15 p refs
(Contract AT(11-1)-3073)
(MATT-1088; IAEA-CN-33/G2-3) Avail: NTIS HC $3.25

Injection of a superthermal ion component into a toroidal plasma can raise the fusion power density to levels considerably higher than those attainable in ordinary one component plasmas. As a result, energy break-even in D-T can be attained in bulk plasmas with ntau-values as low as 10 to the 13th power cm/3 sec, at temperatures of approximately 5 keV. The optimal energy of the superthermal ion component is in the range 100-200 keV; injection energy requirements can be reduced by adiabatic compression prior to or during the reaction phase. The appropriate rate gamma of fast ion pressure to bulk-plasma pressure is about 0.5. The stability of two component tokamak plasmas has been examined, and is found to be favorable for parameters of practical interest. Author

N75-10806# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
ON CHANGES OF VARIABLES IN KINETIC THEORY
Erling Dahlberg Mar. 1974 27 p refs
(TRITA-EPP-74-11) Avail: NTIS HC $3.75

Changes of variables in kinetic theory can and should be effected within the bounds of mathematics. Thus, an appropriate and systematic use of a well-defined set of collision variables allows a straightforward, concise, and comprehensible presentation of typical transformation results; e.g. Boltzmann's collision term, its adaptation for electrons in a cold gas, and Enskog's symmetric-kernel form for the linearized equation. It is also shown how the Allis and Allen form of the left member of Boltzmann's equation (suitable for cases with cylindrical symmetry) can be given a correct derivation and interpretation. Author (ESRO)

N75-10807# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics and Fusion Research.
TRENDS IN NUCLEAR FUSION RESEARCH
B. Lehnert 11 Apr. 1974 21 p refs
(TRITA-EPP-74-12) Avail: NTIS HC $3.25

A review is given of the present state and the future possibilities of nuclear fusion research. The complex of problems is described as well as various approaches for their solution, being based both on magnetic and non-magnetic confinement schemes. Author (ESRO)

N75-10808# Ecole Polytechnique Federale de Lausanne (Switzerland). Centre de Recherches en Physique des Plasmas.
EXPERIMENTAL AND COMPUTATIONAL STUDY OF THE LOW-DENSITY PLASMA IN THE OUTER REGIONS OF A THETA PINCH
P. Hafner and F. Hofmann Jul. 1974 23 p refs Sponsored by Fonds Natl. Suisse de la Rech. Sci.
(LRP-85/74) Avail: NTIS HC $3.25

The time evolution of the electron density was measured in the outer regions of a fast theta pinch by means of a Mach-Zehnder interferometer. The electron density outside the central plasma column is relatively high, i.e. between 1 and 5 times 10 to the 14th power/cu cm. A comparison of these measurements with theoretical calculations led to the conclusion that the pinch must be unstable during the implosion phase. Author (ESRO)

N75-10809# European Space Research Organization, Paris (France).
CALCULATION OF INDUCTIVE PLASMA ACCELERATORS WITH SINUSOIDAL ELECTROMAGNETIC STANDING WAVES FOR CONTINUOUS ENERGY SUPPLY
Armand Meert Jun. 1974 42 p refs Transl. into ENGLISH of Berechnung induktiver Plasmabeschleuniger mit sinusfoermigen, stehenden elektromagnetischen Wellen bei kontinuierlicher Energieversorgung, DLR-F-B-73-108, DFVLR, 7 Sep. 1973
(ESRO-TT-76; DLR-FB-73-108) Avail: NTIS HC $3.75 West Ger. 16.60 DM

The possibilities of inductive plasma acceleration using electromagnetic standing waves generated by a cylindrical coil with sinusoidal current distribution are presented together with the advantages of this method of acceleration. The interest in a quasi-continuous plasma acceleration is explained using examples. The differential equation system set up allows the calculation of the plasma velocity and the requisite output for the dimensioning of the generator and the compensating capacitance. Using a numerical example, an idea of the solution sequence and the orders of magnitude is obtained. Author (ESRO)

N75-10810# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDY ON PROPERTIES OF NONISOTHERMAL ION ACCELERATOR
V. V. Kuznetsov 25 Jun. 1974 14 p refs Transl. into ENGLISH from the monograph "Plazmennye Uskoriteli" 1973 p 114-119
(AD-782052; FTD-HT-23-1058-74) Avail: NTIS CSCL 20/9

A three component hydrodynamic model of nonisothermal plasma gives a good description of the distribution of potentials in a magnetic field for the case where for almost the entire length of the nozzle the conditions of quasi-neutrality are maintained. It is shown that the density of the hot electrons exceeds the density of the electron beam by a factor of 100 in a single electron transit. The problem of creating an ion beam with a smaller degree of divergence proves to be closely related to the problem of cold electrons. Author (GRA)

N75-10811# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACCELERATION OF IONS IN HEAVY-CURRENT ELECTRON BEAMS
A. A. Plyutto and K. S. Suladze 25 Jun. 1974 15 p refs Transl. into ENGLISH from the monograph "Plazmennye Uskoriteli" 1973 p 47-53
(AD-782085; FTD-MT-24-1046-74) Avail: NTIS CSCL 20/9

The formation of heavy current electron beams and the acceleration of ions in beams using a coaxial injector as the plasma source are reported. Experimental results show that plasma emitters can be used for obtaining electron beams with a current of 10,000 to 100,000 A and higher. The perveance of plasma electron sources considerably exceeds the perveance of other sources, including cold emitters. The plasma emitters are promising for obtaining electron beams of approximately 1 million A. Author (GRA)

N75-10812# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Electrical Engineering and Applied Physics.
CHARGED PARTICLE BEAM-PLASMA INTERACTIONS FOR THERMONUCLEAR POWER GENERATION Final Report
Sheldon Gruber Jun. 1974 48 p refs
(Grant AF-AFOSR-1858-70; AF Proj. 9752)
(AD-782060; AFOSR-74-1039TR) Avail: NTIS CSCL 20/9

A beam-plasma instability generated by a beam with a single speed of rotation about a static magnetic field is investigated. The linear growth rates of such an instability are calculated for waves near the upper hybrid frequency of the plasma. The non-linear saturation mechanism of this instability is examined and it is found that beam particle trapping exists and is analogous to the one dimensional case. An experimental investigation of the instability is reported on and several novel techniques for diagnostics are used. Author (GRA)

N75-10813# Science Applications, Inc., Albuquerque, N. Mex.
HOLOGRAPHIC INTERFEROMETRY DEVELOPMENTS FOR DENSE PLASMAS Final Report, Jan. 1973 - Jan. 1974
Carl G. Murphy 20 Feb. 1974 89 p
(Contract DNA001-73-C-0041)
(AD-783511; SAI-73-512-AQ; DNA-3350F) Avail: NTIS CSCL 20/9

The report discusses the necessary parameters for producing interferograms by holography with special attention given to the case of diagnostics for laser-produced plasmas. The design of a dense plasma interferometric experiment is presented.
Author (GRA)

N75-10814# Air Force Academy, Colo.
LINEAR PARAMETRIC INSTABILITIES AT HIGH PUMP POWERS Interim Report, Feb. 1973 - May 1974
Norman F. Roderick Jul. 1974 23 p refs
(AF Proj. 8809)
(AD-783780; USAFA-TR-74-12) Avail: NTIS CSCL 20/9

The linear parametric decay and oscillating two stream instabilities have been studied at high pump power for perturbations propagating oblique to the pump field. The electrostatic Vlasov Poisson system for a homogeneous two component plasma has been solved numerically to investigate the high frequency branches of these instabilities. Results show that the maximum growth rate of the oscillating two stream instability occurs oblique to the pump field for power levels above a critical value. (Modified author abstract) GRA

N75-10815# California Univ., Berkeley. Dept. of Mechanical Engineering.
CONICAL ELECTROSTATIC PROBE RESPONSE IN A WEAKLY IONIZED GAS FLOW Final Report
Charles F. Bruce and L. Talbot May 1974 97 p refs
(Grant AF-AFOSR-1989-71; AF Proj. 9783)
(AD-783261; AFOSR-74-1199TR) Avail: NTIS CSCL 20/9

Conical electrostatic probes of lengths 0.153, 0.393 and 1.0 cm were placed in partially ionized argon flows in the laboratory in order to study the use of their current-voltage characteristics in the measurement of ion number densities over a wide range. The ion densities and electron temperatures of the flows were measured with thin cylindrical electrostatic probes, and the neutral properties were determined from impact pressure, stagnation pressure and stagnation temperature measurements. The current-voltage characteristics of the ion-attracting conical probes were measured and compared to thin and thick sheath theories. Over the whole range of ion densities the measurements agreed reasonably well with the thin sheath theories of Chung and Blankenship (1966) and Denison (1967) which yield explicit expressions for the ion densities in terms of measurable quantities. (Modified author abstract) GRA

N75-10816# Naval Research Lab., Washington, D.C.
INTERIM REPORT ON FOKKER-PLANCK STUDIES OF TWO-COMPONENT-TORI
N. K. Winsor, J. H. Gardner, C. E. Wagner, and J. P. Boris Jul. 1974 24 p refs
(NRL Proj. HC0-65)
(AD-783036; NRL-MR-2833) Avail: NTIS CSCL 20/9

The two-Component-Torus concept has been studied for transient beam injection into a target plasma with impurities and losses. Two figures of merit are calculated for various beam target parameters, to show the sensitivity of TCT performance to these parameters. The time dependences of important parameters are presented for a representative case.
Author (GRA)

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N75-10817 Washington Univ., St. Louis, Mo.
AN INVESTIGATION OF ELECTRO-OPTICAL MODULATION METHODS IN GaSs EPITAXIAL THIN FILM WAVEGUIDES AT 10.6 MICRON WAVELENGTH Ph.D. Thesis
Ton Ko 1974 187 p
Avail: Univ. Microfilms Order No. 74-23639

A theoretical study was made of VHF-UHF electro-optical modulation in GaAs epitaxial thin waveguide structures for the CO2 laser radiation at 10.6 wavelength. Various electro-optical modulation schemes for both the phase and the amplitude modulations in one- and two-dimensional thin waveguide structures were considered and compared with each other. The insertion loss and the modulation drive power also were taken into consideration. Numerical results for several modulation schemes are presented so that the design of guided wave VHF-UHF modulators can be optimized based upon currently available materials. Dissert. Abstr.

N75-10818 Case Western Reserve Univ., Cleveland, Ohio.
VORTEX RING GENERATED LEVEL DIFFERENCES IN SUPERFLUID HELIUM Ph.D. Thesis
Ronald Francis Carey 1974 77 p
Avail: Univ. Microfilms Order No. 74-16479

Level differences between two baths of liquid helium connected by an orifice were generated by a charged vortex ring beam incident on the diaphragm containing the orifice. The data were interpreted in terms of phase slippage caused by vortex rings which overlapped the orifice. Deviation of the data from expected results was examined in light of vortex ring interactions and beam spreading. Dissert. Abstr.

N75-10819 Arizona State Univ., Tempe.
THE TWO DIMENSIONAL TRANSIENT SOLUTION OF THE CARRIER TRANSPORT EQUATIONS IN SOLID-STATE DEVICES Ph.D. Thesis
Gerald Willard Brown 1974 180 p
Avail: Univ. Microfilms Order No. 74-19278

A description is given of a general technique for obtaining the transient numerical solution of the basic carrier transport equations for solid state devices. The new algorithm, formulated for digital computation, employs an alternating-direction-implicit method. This method, first used in the numerical solution of the heat flow equation, was modified in the present work and was applied to the system of equations consisting of Poisson's Equation and the hole and electron continuity equations. For the purpose of minimizing computational complexity, uniform temperature, constant carrier mobility and carrier diffusion constants and the absence of any significant trapped charge are assumed. Oxide layers and surface charge are not considered. Examples are presented which illustrate the utility of the program for investigating the properties of p-n junctions and a comparison is made between the results obtained with the one and the two-dimensional models. Dissert. Abstr.

N75-10820 Rice Univ., Houston, Tex.
GALLIUM ARSENIDE SUBMILLIMETER PHOTOCONDUCTIVE DETECTION Ph.D. Thesis
James Duane Crowley 1974 104 p
Avail: Univ. Microfilms Order No. 74-21259

Two different submillimeter detection systems utilizing GaAs as the detector element were constructed and evaluated. The first was a DC biased system using a 100 micron epitaxial layer of GaAs on an insulating substrate. The peak responsivity was 55,000 volts/watt. Measurements of the noise spectrum indicated that the predominate noise mechanism was 1/f noise. The second detection system utilized microwave biasing of the GaAs detector element. A 130 micron epitaxial layer of GaAs grown on a degenerately doped substrate was mounted in a microwave cavity. The optimum cavity coupling was determined, and responsivity of 5.3 volts/watt was achieved. It is shown that increased responsivity of the microwave biased system can be achieved by optimizing the detector dimensions and the cavity design. The large bandwidth of this system, in comparison to that of the DC biased configuration, allows much better utilization of the fast response time of the GaAs. Dissert. Abstr.

N75-10821 Maryland Univ., College Park.
THE APPLICATION OF CODING TO IMPROVE THE YIELD AND RELIABILITY OF SEMICONDUCTOR MEMORIES Ph.D. Thesis
Rodger Allan Cliff 1974 114 p
Avail: Univ. Microfilms Order No. 74-22225

The yield of large scale integration (LSI) semiconductor memory chips can be greatly improved by the application of coding. An LSI chip with K information cells, each of which has probability of being good at the time of manufacture. The contents of these cells are encoded as K/k(n,k) codewords, having m

check bits each and being capable of correcting any combination of c or fewer faults per codeword. The use of an overall byte error correcting code at the memory system level is considered. It is shown that internal correction on the chip plus overall byte correction at the system level ban dramatically decrease cost and/or increase reliability. Dissert. Abstr.

N75-10822 Izdatelstvo Nauka, Moscow (USSR).
ELECTROLUMINESCENCE OF CRYSTALS
I. Vereshchagin 1974 281 p refs In RUSSIAN
Copyright. Avail: Issuing Activity

Physical principles are discussed for those phenomena occurring in a solid body, which are associated with the spontaneous transformation of electrical energy into light. Such phenomena are the bases upon which the operation of semiconductor sources of light, image amplifiers and transformers, telescreens, and other optical-electronic apparatus depend. General properties are considered for various types of luminescence which are exhibited in crystals under the influence of both weak and strong electrical fields. Detailed information is presented on materials which give off light in the visible region of the electromagnetic spectrum. Author

N75-10823 Rice Univ., Houston, Tex.
FLUCTUATION EFFECTS IN THE SUPERCONDUCTING TRANSITION OF RHENIUM Ph.D. Thesis
Roland Schreiber 1974 112 p
Avail: Univ. Microfilms Order No. 74-21327

The diamagnetic behavior of a superconductor in a weak magnetic field was investigated above and below T sub c, and in the transition region. The transition temperature was found for five zone refined rhenium single crystals with varying annealing histories. The dependence of the transition width on the annealing history was studied. The transition width was found to be dependent on the field strength. Above T sub c the small diamagnetic susceptibility was measured. Below T sub c the isothermal superconduction magnetization curves were measured at temperatures such that .3 Oe > H sub C > approximately 5 mOe. The thermodynamic field curve slopes were computed for critical fields both larger than and less than approximately 50 mOe. A simple point defect model was introduced to interpret these results. The observed changes were caused by the superposition of effects due to the sample inhomogeneities and thermal fluctuations of the superconducting order parameter. Dissert. Abstr.

N75-10824 Lehigh Univ., Bethlehem, Pa.
ANALYTICAL MODELING OF DEFECTS IN SOLIDS Ph.D. Thesis
Dachung Pat Peng 1974 131 p
Avail: Univ. Microfilms Order No. 74-21433

Analytical models for defects in solids, such as edge dislocations, microcracks and macrocracks are presented which consider the deviational positioning of atoms on a special slip plane resulting from a local residual stress in a limited region. The cohesive shear force between the surfaces is assumed to take the active role in analyzing the deformation field around the defect, instead of the conventionally assumed Burgers vector. The solution of this analytical model is valid, in regions both far from and near to the defect. A relationship between the resulting Burgers vector of an edge dislocation with other material constants was achieved. The maximum normal stress was found at the waist of an edge dislocation. Dissert. Abstr.

N75-10825 Kent State Univ., Ohio.
OPTICAL AND FARADAY STUDIES OF LIQUID CRYSTALS Ph.D. Thesis
Anne Filer Schenz 1974 115 p
Avail: Univ. Microfilms Order No. 74-19402

The magnetic rotation of MBBA (4-methoxybenzylidene-4'-n-butylaniline) was determined in the nematic and isotropic phase at a fixed wavelength. The effects of birefringence were minimized by averaging rotations measured in forward and reverse magnetic fields. The Verdet constant increased with increasing temperature in the nematic phase up to the clearing point where it rose abruptly to a constant value in the isotropic phase. The Verdet constants of seven alkyl homologs of MBBA were determined at a fixed temperature in the isotropic phase. A pretransition effect was observed in the optical rotation of cholesteryl esters within approximately 10 degrees of the isotropic yields cholesteric transition. The optical activity in the blue texture was also investigated. The texture, which was optically isotropic, possessed a large positive optical rotation in contrast to the relatively small negative rotation of the isotropic liquid. The rotation in the blue texture was temperature dependent. Dissert. Abstr.

N75-10826 Kentucky Univ., Lexington.
RADIATION DAMAGE IN METAL-SEMICONDUCTOR TUNNEL JUNCTIONS Ph.D. Thesis
Henry Merrick Darley 1973 206 p
Avail: Univ. Microfilms Order No. 74-19611

Metal-semiconductor tunnel junctions were irradiated at room temperature with a 3MeV proton beam. The effects of the radiation introduced defects on the current versus voltage characteristics were studied. The samples were prepared by cleaving degenerate Ge:As in a vacuum in a stream of evaporating indium. Indium was chosen for the metal as a preliminary study has shown that heating up to 120 C did not effect current-voltage characteristic of In-Ge junctions. Contact to the metal was made through the use of photoresist techniques. After the initial curve was taken the junctions were irradiated with the beam impinging on the In. The radiation flux and temperature of the sample were monitored during irradiation. The incremental resistance curve was then retaken after which the process was repeated. On five curves, supplementary magnetic field studies were conducted. Dissert. Abstr.

N75-10827 Michigan State Univ., East Lansing.
DISPERSION AND INSTABILITY CHARACTERISTICS OF SOLID-STATE CARRIER WAVES IN MICROWAVE INTEGRATED SYSTEMS Ph.D. Thesis
Chang Eon Kang 1974 162 p
Avail: Univ. Microfilms Order No. 74-19826

The analysis is based on the Maxwell's, continuity, and Boltzmann transport equations, and is developed in a general manner. Two models of wave interactions are mainly investigated in the frequency range of 1 10 GHz: the first model of interaction is obtained between a carrier stream in semiconductors and the slow circuit waves guided by meander-tape line, and the second model of interaction is obtained due to velocity-modulated carrier waves in two adjacent streams propagated in the same direction. By introducing the carrier effective mass and collision frequency, the scattering effects in solids are taken into account. In the interaction of the carrier stream with RF circuit waves, a hydrodynamic model is adopted to describe the behavior of the carrier motion. Dissert. Abstr.

N75-10828# California Univ., Berkeley. Lawrence Berkeley Lab.
APPLICATION OF THE CLASSICAL THEORY OF ELECTRONS IN GASES TO MULTIWIRE PROPORTIONAL AND DRIFT CHAMBERS
V. Palladino (CERN, Geneva, Switzerland) and B. Sadoulet Apr. 1974 80 p refs
(Contract W-7405-eng-48)
(LBL-3013) Avail: NTIS HC $4.75

The classical theory of electrons in gases and some of its results are reviewed which may be useful in the design of multiwire proportional and drift chambers. Especially discussed are how to obtain low diffusion and constant drift velocity in certain gas mixtures, and the multiplication process. Author

N75-10829# Grumman Aerospace Corp., Bethpage, N.Y. Research Dept.
A MODEL FOR GAS-SURFACE DISTRIBUTION FUNCTIONS
John W. Brook Sep. 1974 16 p refs
(RM-591) Avail: NTIS HC $3.25

A technique to incorporate the results of complete gas-surface trajectory computations into rational mathematical expressions for the exiting gas distribution functions is outlined. These expressions are of the generalized Gaussian, or ellipsoidal, type. Specific examples show how the undetermined parameters of such models are determined from various higher moments that are accessible only through complete sets of trajectory computations. The resulting distribution function models give reasonable

representations of the flux distributions computed from the trajectory calculations, and also those measured in corresponding laboratory experiments. Author

N75-10830# Bendix Corp., Kansas City, Mo.
CONTROL OF ELECTROSTATIC DAMAGE TO SOLID STATE DEVICES Technological Spinoff Report
W. J. Kirk, Jr., L. S. Carter, and M. L. Waddell Mar. 1974 24 p refs
(Contract AT(29-1)-613)
(BDX-613-1080) Avail: NTIS HC $3.25

Static voltages generated on human bodies by normal movement of assembly personnel can degrade or destroy many solid state devices not normally expected to be susceptible to damage from such a source. An energy-storage model of the human body was developed and used to determine the levels of static voltage that degrade various devices. A system was assembled and used to continuously monitor and display the level of static voltage on an operator. The additional problem of static voltages created by solvent-spraying was studied and the benefits of varying the solvent volume resistivity were verified. Author (NSA)

N75-10831# California Univ., Livermore. Lawrence Livermore Lab.
HIGH PURITY GERMANIUM-LOW TEMPERATURE HALL ANALYSES
R. Wichner, S. P. Swierkowski, and G. A. Armantrout 14 Nov. 1973 18 p refs Presented at the Nucl. Sci. Symp., San Francisco, 14 Nov. 1973 Sponsored by AEC
(UCRL-74832; Conf-731112-32) Avail: NTIS HC $3.25

Results are given of low temperature Hall measurements on 58 samples of high purity germanium. The measurements show the presence of deep (Cu) and shallow level (Group III and V) chemical impurities as well as deep energy levels associated with complex vacancy and/or oxide defects. It was found that high purity germanium tends to be rather well compensated, i.e., the individual acceptor or donor concentrations are typically 3 to 10 times that of the net carrier concentration at 77 K. Shallow level impurity problems seem to be associated with Al most frequently, with some boron contamination observed. The presence of defect related deep levels has also been observed. Author (NSA)

N75-10832# Cornell Univ., Ithaca, N.Y. Lab. of Atomic and Solid State Physics.
SECONDARY HIGH PRESSURE STANDARD FOR THE FAR-INFRARED SPECTRAL REGION
B. T. Smith and A. J. Sievers Feb. 1974 6 p refs
(Contract AT(11-1)-3151)
(COO-3151-37; Rept-2170) Avail: NTIS HC $3.25

The defect lattice mode is NaCl: Cu(+) provides a convenient secondary pressure standard for far infrared measurements of solids at low temperatures. Author (NSA)

N75-10833# Sandia Labs., Albuquerque, N.Mex.
SURFACE ELECTRONIC PROPERTIES AND THE SEARCH FOR NEW HYDROGEN OXIDATION CATALYSTS
G. E. Laramore, J. E. Houston, and R. L. Park 1973 10 p refs Presented at the Hydrogen Econ. Miami Energy Conf., Miami Beach, Fla., 18 Mar. 1974 Sponsored by AEC
(SLA-73-5805; Conf-740306-3) Avail: NTIS HC $3.25

The development of cheap substitutes for the noble metals as oxidation catalysts provides alternatives to direct combustion in the utilization of hydrogen as an energy source. Current likely candidates are the transition metal carbides that have many of the desirable properties of the noble metals with respect to hydrogen oxidation and hydrogenolysis. In an attempt to understand this phenomenon and to perhaps systematize the search for new catalytic materials, the surface electronic properties of tungsten, tungsten carbide, and platinum have been measured and compared. Author (NSA)

N75-10834# Sandia Corp., Albuquerque, N.Mex.
IN-SITU TRANSPORT MEASUREMENTS ON UHV GROWN a-Ge SAMPLES
M. L. Knotek 1974 11 p refs Presented at the Intern. Conf. on Tetrahedrally bonded Amorphous Semicond., Yorktown Heights, N. Y., 20 Mar. 1974 Sponsored by AEC
(SLA-73-7074; Conf-740313-2) Avail: NTIS HC $3.25

The annealing properties of both high and low substrate temperature a-Ge samples were examined. The behavior of high T sub s samples is seen to agree with those previously reported. The behavior for low T sub s samples is shown to have a wide range of behavior that may or may not be a function of the vacuum during annealing. Depth profiles of oxygen and carbon from Auger spectroscopy have been obtained and results show that high oxygen levels exist in low T sub s samples after annealing. In the low temperature regime it is shown that for the data the variable range tunneling mechanism explains the temperature, annealing, and thickness dependence of the conductivity quite well. Some inconsistencies which remain between the data and theory are noted. Author (NSA)

N75-10835# Rochester Univ., N.Y. Dept. of Physics and Astronomy.
NETWORK MODELS OF CRYSTALS Final Report
Elliott W. Montroll 1974 5 p
(Contract N00014-71-C-0308)
(AD-784516) Avail: NTIS CSCL 20/12

The subject matter of the research on this contract has been two-fold: (1) network models for electrons in solids (2) stochastic models of transport in amorphous materials. A list of publications is included. GRA

N75-10836# Army Foreign Science and Technology Center, Charlottesville, Va.
DEVICES BASED ON THERMOELECTRICAL PHENOMENA
A. F. Gorodetskii, A. F. Kravchenko, and E. M. Samoilov 12 Apr. 1974 24 p refs Transl. into ENGLISH from the monograph "Osnovy Fiz. Poluprovod. i Poluprovod. Prib" USSR, 1966 p 315-326
(AD-783821; FSTC-HT-23-45-74) Avail: NTIS CSCL 20/12

The energy fundamentals of thermoelectric generators are presented, for the direct conversion of thermal energy into electrical at high efficiency and to produce cold in refrigeration units. The conditions under which the efficiency of an actual thermoelectric generator will be at a maximum are described. Thermostatting radioelectric devices are also discussed. GRA

N75-10837# Perkin-Elmer Corp., Norwalk, Conn. Optical Group.
MOLECULAR BEAM EPITAXY OF 2-4 COMPOUND WAVEGUIDES Technical Report, 1 Mar. - 30 Jun. 1974
Donald L. Smith 22 Jul. 1974 14 p refs
(Contract N00014-73-C-0280; ARPA Order 2327)
(AD-784650) Avail: NTIS CSCL 20/2

Monocrystalline films of ZnSe and ZnTe have been grown by molecular beam epitaxy on GaAs(110) and (100) at 300 to 350C. ZnTe(100) films are as smooth as the chemically-polished substrate (smooth to tens of Angstroms), while the others are considerably rougher. Films grown on BaF2(100) are polycrystalline. ZnTe/Zn(SeTe)/GaAs(100) is proposed for an optical waveguide system. Author (GRA)

N75-10838# California Univ., Berkeley. Electronics Research Lab.
STUDIES OF SPIN-WAVE MODE-LOCKING AND PHONON MAGNON INTERACTION AND THE POTENTIAL USE OF THE EFFECTS FOR DEVICE APPLICATIONS Final Report, 15 Aug. 1967 - 14 Nov. 1973
Shyh Wang 1974 9 p refs
(Grants DA-ARO(D)-31-124-G947;
DA-ARO(D)-31-124-70-G12; DA-ARO(D)-31-124-71-G36)
(AD-784676; AROD-7101-19-E) Avail: NTIS CSCL 20/12

The work covered in this report is divided into two stages. First, in a study of magneto-acoustic wave interaction, mode locking of spin waves and parametric generation of acoustic waves were observed. Large oscillations in magneto-acoustic waves transmitted through YIG as a function of applied magnetic field were detected. The phenomenon was a result of acoustic Faraday rotation and can be used to build nonreciprocal acoustic devices. During the second stage, the author studied the use of gyrotropic and anisotropic materials for thin-film optical-waveguide applications. The principles governing polarization conversion in thin-film optical guides were elucidated, and

experiments verifying the effects were performed. It was shown that, based on mode conversion, it should be possible to build a large class of thin-film devices for integrated optics, such as modulators, optical switches, gyrators, and isolators. (Modified author abstract) GRA

N75-10839# Maryland Univ., College Park. Dept. of Physics and Astronomy.
CONDUCTION ELECTRONS AND MAGNETISM Final Report, 15 Apr. 1971 - 14 Apr. 1974
Richard E. Prange 30 Jun. 1974 12 p refs
(Grant DA-ARO(D)-31-124-71-G114)
(AD-783401; AROD-9606-7-P) Avail: NTIS CSCL 20/12

During the period of this grant, significant progress was made towards an understanding of the ferromagnetism of metals. Since some of the basic problems of ferromagnetism concern the analysis of the phase transition, the author first studied analogous systems which could be handled more readily, or for which experiments were more accessible. This progress involved several related lines of inquiry. These included an analysis of the low temperature damping of long wavelength spin waves, an analysis of the interaction of collective and single-particle excitations (in the context of superconductivity), work on the formal theory of phase transitions in systems with a large number of spin degrees of freedom and work on the influence of surfaces and interfaces in phase transitions. Consideration of these various aspects of the problem has led us to a new approach to the theory of metallic ferromagnetism, which is now under active development. (Modified author abstract) GRA

N75-10840# Radio Corp. of America, Princeton, N.J.
THE 3-5 SURFACE STUDIES Interim Technical Report, 1 Nov. 1973 - 31 Jan. 1974
Bernard Goldstein Feb. 1974 37 p refs
(Contract DAAK02-74-C-0081)
(AD-784206; PRRL-74-CR-10; ITR-1) Avail: NTIS CSCL 07/4

The authors have studied the structural and chemical state of the GaAs surface and have been able to characterize this surface at various stages during activation to a state of Negative Electron Affinity which is produced by the adsorption of cesium and oxygen. The LEED-Auger properties, the cesium and oxygen interactions, and the photoemissive characteristics have been studied as a function of temperature from -170 to 600C. An atomic model for the NEA GaAs/Cs/O surface is discussed. Studies have begun of the Ga/In/As ternary system in order to extend the photoemissive response into the 1- to 2-micrometer region. Plans have been developed for the systematic study of compound semiconductor surface structures in terms of differences in atomic radii and electronegativity between the constituent III-V atoms. (Modified author abstract) GRA

N75-10841# Frankford Arsenal, Philadelphia, Pa. 20/12
AN EXPERIMENTAL DETERMINATION OF LONG WAVELENGTH PHONONS AND ANOMALOUS DIELECTRIC BEHAVIOR IN PROUSTITE AND PYRARGYRITE
Harold H. Byer Sep. 1973 282 p refs
(DA Proj. 1T0-61102-B-11A)
(AD-784309; FA-R-2090) Avail: NTIS

In this work, the Raman, far-infrared, dielectric and group theoretical properties of proustite (Ag3AsS3) and pyrargyrite (Ag3SbS3) were studied. The data and analyses provide information about the long wavelength lattice vibrations of these materials, as well as characterize anomalous dielectric behavior at elevated temperatures (= 250K). The Raman scattering experiments resulted in the observation of 6A(1) and 13E fundamental vibrational modes for both materials. The forward- and back-scattering Raman experiments enabled the longitudinal and transverse optic phonons to be separated (A(1)). Using these results and the Lyddane-Sachs-Teller relation, the low frequency dielectric constant was calculated. An anomalous dielectric behavior at elevated temperatures was attributed to silver ionic conduction in the material and not to a lattice mechanism (ferroelectric phase transition). A model was proposed in which the differences in conductivities of the bulk and space-charge/interface region lead to an interfacial polarization and concomitant rise in the dielectric constant. GRA

N75-10842# Radio Corp. of America, Princeton, N.J.
THE III-V SURFACE STUDIES Interim Technical Report, 1 Feb. - 30 Apr. 1974
Bernard Goldstein May 1974 20 p
(Contract DAAK02-74-C-0081)
(AD-784342; PRRL-74-CR-34; ITR-2) Avail: NTIS CSCL 07/4

Work during this quarter centered on the surface properties of GaInAs(100); most of the measurements were made on samples containing 40% In and 63% In. In general the LEED-Auger behavior is the same as that found for GaAs. The highest white light photoemissive efficiencies (at room temperature) are reported. Threshold measurements indicate that in neither case is negative electron affinity (NEA) achieved, although the photoemission shows that the vacuum level has been considerably lowered. The temperature dependence of the photoemission is discussed. The surprising preferential desorption of In from GaInAs, reported earlier by Auger measurements, has been confirmed by Quadrupole Mass Analysis of the desorption products as a function of temperature. (Modified author abstract) GRA

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N75-10843 Oklahoma Univ., Norman.
CORRELATION OF THERMODYNAMIC PROPERTIES OF FLUIDS THROUGH GENERALIZED HARD SPHERE-AUGMENTED EQUATION OF STATE Ph.D. Thesis
Jyue-Sheng Wang 1974 136 p
Avail: Univ. Microfilms Order No. 74-22002

A generalized hard sphere-augmented equation of state was developed for prediction of thermodynamic properties and phase equilibrium of mixtures as well as pure compounds. The hard sphere volume was expressed in reduced form as functions of acentric factor and reciprocal reduced temperature. The generalized equation of state parameters were determined by multiproperty regression of PVT, enthalpy, vapor pressure, velocity of sound and heat capacity data for pure normal paraffin hydrocarbons methane through octane. A total of more than 2500 data points for pure fluids were tests for polar and nonpolar compounds, paraffin, olefin, naphthene and aromatic hydrocarbons and nonhydrocarbons. The lowest reduced temperature was 0.27 for propane and the highest reduced pressure was 20.4 for normal pentane. Dissert. Abstr.

N75-10844*# National Bureau of Standards, Boulder, Colo. Cryogenics Div.
CALCULATED LIQUID PHASE THERMODYNAMIC PROPERTIES AND LIQUID-VAPOR EQUILIBRIA FOR FLUORINE-OXYGEN (FLOX) MIXTURES Final Report, Nov. 1972 - Sep. 1973
W. R. Parrish and M. J. Hiza Sep. 1973 30 p refs
(NASA Order C-32369-C)
(NASA-CR-140709; NBSIR-73-338) Avail: NTIS HC $3.75 CSCL 20M

Liquid phase thermodynamic properties and liquid-vapor equilibria of fluorine-oxygen mixtures, for which no experimental data exist, have been calculated. The results are based on excess properties predicted from the Snider-Herrington equations, with an adjusted combining rule, and the corresponding data for the pure fluids. Mixtures considered were 0.6, 0.7, 0.8, 0.88, and 0.9 weight fraction of fluorine from 55 to 90K up to 7 million Pa. In the compressed liquid, molar volumes, enthalpy, entropy, and constant pressure specific heat were determined. Along the saturation boundary, coexistent vapor compositions and solution vapor pressures were determined as well. Corresponding properties of pure fluorine from experimental data have also been included. Results are tabulated in both British and S.I. units. Author

N75-10845# Naval Postgraduate School, Monterey, Calif.
NATURAL CONVECTION FLOW VISUALIZATION AND HEAT TRANSFER FROM A HORIZONTAL CIRCULAR DISK M.S. Thesis
Joseph Michael OConnor Jun. 1974 60 p refs
(AD-783793) Avail: NTIS CSCL 20/13

The study of natural convection incorporates a flow visualization procedure, with heat transfer experiments on a circular mirror like surface, in a cylindrical enclosure. A flow visualization procedure using Thymol Blue sodium salt in distilled water was conducted. Photographs are presented which show the cellular flow pattern on the horizontal test surface and the nature of the flow in the plume. Problems applying the flow visualization technique are discussed. Photographs are presented which show the effect of voltage on a laminar natural convection flow in the plume. Transition to turbulence in the plume was observed. Experimental results are presented for the heat transfer from the horizontal circular disk. This data was compared to previously reported results and the agreement was good. (Modified author abstract) GRA

N75-10846# Bureau of Mines, Albany, Oreg. Metallurgy Research Center.
THERMODYNAMICS OF THE Al-Si SYSTEM Report of Investigations
Seth C. Schaefer Jun. 1974 20 p refs
(PB-234070/1; BM-RI-7895) Avail: NTIS HC $3.00 CSCL 07D

Thermodynamic properties of liquid Al-Si alloys have been studied with the aid of a high temperature galvanic cell employing a fused-salt electrolyte. Activities of aluminum and silicon (referred to pure liquid metals) show a pronounced negative deviation from Raoult's law in liquid alloys containing 0.9 to 35.2 atomic-percent silicon. Partial and integral thermodynamic properties for the Al-Si system are tabulated and illustrated. GRA

N75-10847# Army Foreign Science and Technology Center, Charlottesville, Va.
NONEQUILIBRIUM STATISTICAL THERMODYNAMICS
D. N. Zubarev 19 Sep. 1973 504 p refs Transl. into ENGLISH from unidentified Russian book
(AD-784411; FSTC-HT-23-1138-73) Avail: NTIS CSCL 20/10

This book examines the state of the art of nonequilibrium statistical thermodynamics from a single viewpoint. The book is intended for physicists and physical chemists working in the fields of theoretical physics, molecular physics, physical chemistry, and chemical physics. GRA

N75-10848# Harry Diamond Labs., Washington, D.C.
STATISTICAL MECHANICS OF ONE-DIMENSIONAL SINGLE COMPONENT LANDAU-GINZBURG FIELDS
Richard P. Leavitt Jan. 1974 29 p
(DA Proj. 1T0-61101-A-91A)
(AD-783477; HDL-TR-1657) Avail: NTIS CSCL 20/10

The single-component Landau-Ginzburg problem is solved approximately in one dimension. A variational solution is obtained for the equivalent anharmonic oscillator problem in quantum mechanics; the specific heat, the susceptibility, the order parameter correlation function, and the order parameter in a small external field are obtained from the solution. These results show that there is no sharp phase transition, although the system becomes ordered at low temperatures upon application of a very small field. Author (GRA)

N75-10214 Joint Publications Research Service, Arlington, Va.
INDIRECT DETERMINATION OF SPECIFIC HEAT FLUXES IN THE CRYSTALLIZER WALL DURING EShP
G. S. Marinskiy, B. B. Fedorovskiy, V. M. Gaglay, and V. I. Us *In its* Electroslag Remelting (JPRS-63-220) 17 Oct. 1974 p 6-7 Transl. into ENGLISH from the book "Rafiniruyushchiye Pereplavy" Kiev, 1974 p 50-51 (For availability see N75-10212 01-26)

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N75-10849 Boston Univ., Mass.
THE SOCIAL COST OF AIRPORT NOISE AS MEASURED BY RENTAL CHANGES: THE CASE OF LOGAN AIRPORT Ph.D. Thesis
Irwin Price 1974 97 p
Avail: Univ. Microfilms Order No. 74-14225

Logan International Airport in Boston, Massachusetts and the residential communities that surround it were the focus of an examination of the effects of aircraft noise on household, ranging from annoyance to psychological and physiological damage, and especially the social costs defined as those actions of business firms which have harmful effects on others; i.e. rental costs which lessen in market value and which, in turn, lower the social desirability of the neighborhoods. Rent values were taken from census tract data in 1960 and 1970, and the noise measurements took into account such factors as frequency of flights, type of aircraft, distance from the ground, duration of the noise, and the time of day the overflight occurred. An increase in the noise exposure forecast level of the observed 10 units resulted in an increase in rent from 1960 to 1970 that was about 13 percentage points lower than it would have been without the noise. Dissert. Abstr.

N75-10850# Committee on Labor and Public Welfare (U. S. Senate).
EFFECTS OF ENERGY CRISIS ON EDUCATION, 1974
Washington GPO 1974 296 p refs Hearing before Subcomm. on Education of Comm. on Labor and Public Welfare, 93d Congr., 2d Sess., 7 Jan. 1974
(GPO-27-765) Avail: Subcomm. on Education

The increased costs of fuel, both for physical plant heating and for bus transportation, were discussed before Congress in terms of public school budgets and expenditures. Special allocations of oil to elementary and secondary schools are considered, along with the discontinuance of school busing for desegregation purposes. Actions taken by HEW, in cooperation with the Federal Energy Office, to respond to the energy shortage as it affects the educational community are outlined. A.A.D.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N75-10851*# Business and Technological Systems, Inc., Seabrook, Md.
COMPUTATIONS OF M SUB 2 AND K SUB 1 OCEAN TIDAL PERTURBATIONS IN SATELLITE ELEMENTS Final Report
Ronald H. Estes Aug. 1974 30 p refs Submitted for publication
(Contract NAS5-20045)
(NASA-CR-139124; BTS-TR-74-13) Avail: NTIS HC $3.75 CSCL 22C

Semi-analytic perturbation equations for the influence of M2 and K1 ocean tidal constituents on satellite motion are expanded into multi-dimensional Fourier series and calculations made for the BE-C satellite. Perturbation in the orbital elements are compared to those of the long period solid earth tides. Author

N75-10852# Navy Dept., Washington, D.C.
PROCEEDING OF THE COLLOQUIUM ON TECHNOLOGY TRANSFER
Ralph I. Cole and Sherman Gee Sep. 1973 100 p refs Conf. held at Washington, D. C., 5-7 Sep. 1973
(AD-782723) Avail: NTIS CSCL 05/1

Contents: Technology transfer overview; Case studies from the interface agent's perspective; Case studies from the civilian user's perspective; Case studies from the federal resource perspective; Looking to the future. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N75-10853*# Hughes Aircraft Co., Culver City, Calif. Space and Communications Group.
VERSATILE DATA HANDLING SYSTEM STUDY Final Report
Jul. 1974 66 p
(Contract NAS5-21959)
(NASA-CR-139123; SCG-40264R; Ref-D0796) Avail: NTIS HC $4.25 CSCL 05B

The objective of the study is discussed to arrive at recommendations for the most suitable image recording equipment for the use with various spaceborne earth observation sensors. Future sensors presently under consideration were included in the study, as well as existing sensors and those under development. Author

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N75-10854# Committee on Ways and Means (U. S. Senate).
THIRD ANNUAL REPORT ON THE FINANCIAL CONDITION AND RESULTS OF THE OPERATION OF THE AIRPORT AND AIRWAY TRUST FUND Annual Report of the Dept. of the Treasury to the Congress of the United States
John K. Carlock Washington GPO 1974 11 p Presented to the Comm. on Ways and Means, 93d Congr., 2d Sess., 30 Jun. 1973 Prepared by the Dept. of the Treasury
(H-Doc-93-230; GPO-29-552; AR-3) Avail: US Capitol, House Document Room

A Congressional hearing was conducted to determine the financial condition and results of the operation of the airport and airway trust fund. The report contains comment on the highlights of the fund, data on current and prior year operations and financial condition, and estimated data for the following fiscal years. Supporting statements include annual and cumulative data on the basis of existing legislation for each fiscal year through fiscal 1978. Author

N75-10855# Committee on Interior and Insular Affairs (U. S. Senate).
MARKET PERFORMANCE AND COMPETITION IN THE PETROLEUM INDUSTRY, PART 2
Washington GPO 1974 335 p refs Hearings on S. Res. 45 before Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., 5-6 Dec. 1973
(GPO-28-740) Avail: Comm. on Interior and Insular Affairs

Financial statements by numerous large utility and oil companies were submitted to Congress, along with individual assessments of the oil shortage situation and its effect on market performance and competition. Alternative sources of energy, particularly that of nuclear electric power, are discussed in terms of current annual capital expenditures experienced by operational plants, as well as projected costs for more widespread nuclear power utility. Other statistical data are included for production capability forecasts and profit expectations for companies within the energy sector. A.A.D

N75-10856# Joint Publications Research Service, Arlington, Va.
ECONOMY IN DESIGN OPERATIONS
I. A. Bandyk 23 Sep. 1974 131 p refs Transl. into ENGLISH of the book "Ekonomichnost Konstruktorskikh Razrabotok" Kishinev, 1972 159 p
(JPRS-63034) Avail: NTIS HC $5.75

Methods of analysis and determination of the optimum design solutions are described. The solutions are shown to increase the design, technological, and operational economy of new equipment. Author

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N75-10857# Committee on Ways and Means (U. S. Senate).
ELIMINATION OF DUTY ON METHANOL IMPORTED FOR CERTAIN USES
Ullman Washington GPO 1974 5 p Rept. to accompany H.R. 11251 presented by Comm. on Ways and Means, 93d Congr., 2d Sess., 23 Apr. 1974
(H-Rept-93-998; GPO-99-081) Avail: US Capitol, House Document Room

A Congressional hearing was conducted on the proposal to remove duty payments on methanol imported for certain uses. The purpose of the bill is to provide duty-free status for methyl alcohol (methanol) when imported for use in producing synthetic natural gas or for direct use as a fuel. The effect of the bill on revenues is examined. The bill was unanimously ordered favorably by the committee. Author

N75-10858# Committee on Merchant Marine and Fisheries (U. S. House).
HIGH SEAS OIL PORT ACT
Sullivan Washington GPO 1974 40 p Rept. to accompany H.R. 11951 presented by Comm. on Merchant Marine and Fisheries, 93d Congr., 2d Sess., 15 May 1974
(H-Rept-93-1042; GPO-99-006) Avail: US Capitol, House Document Room

A Congressional hearing was conducted on a bill to authorize the construction and operation of high seas oil ports, to be located in the offshore coastal waters on the United States. The purpose of the ports is to facilitate the importation of petroleum and petroleum products into the United States. The subjects discussed include: (1) the license to construct, (2) activities prohibited, (3) environmental considerations, (4) operating procedures, (5) international cooperation, and (6) liability for damage. Author

N75-10859# Committee on Appropriations (U. S. House).
PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1975. PART 6: TENNESSEE VALLEY AUTHORITY
Washington GPO 1974 288 p Hearings before Subcomm. on Public Works of Comm. on Appropriations, 93d Congr., 2d Sess., 10 Apr. 1974
(GPO-32-403) Avail: Subcomm. on Public Works

A Congressional hearing was conducted to determine the fiscal year 1975 appropriations for: (1) public works for water, (2) power development, and (3) the atomic energy commission. The various projects to be conducted by the agencies concerned are explained to justify the allocation of the requested funds. Charts are presented to show prior year funding for the various projects. Testimony by selected witnesses is submitted to show the accomplishments and plans of the organizations. Author

N75-10860# Committee on Interior and Insular Affairs (U. S. Senate).
NATIONAL CRUDE OIL REFINERY DEVELOPMENT ACT, PART 2
Washington GPO 1974 177 p refs Hearings on S. 2743 before Comm. on Interior and Insular Affairs, 93d Congr., 2d Sess., 29-30 May 1974
(GPO-35-578) Avail: Comm. on Interior and Insular Affairs

The need for increased refining capacity among independent domestic refiners was described to Congress in a hearing which attempted to obtain background information supportive of the issues involved in the proposed National Crude Oil Refinery Development Act. Other questions dealt with include: (1) the need for a continuation of the mandatory allocation program beyond its expiration date; (2) the effect of the elimination of

oil import fees on independent refiners; and (3) the need for making a portion of the crude oil imported through the use of supertankers and deepwater ports available to those without reasonable access to supertankers. A.A.D.

N75-10861# Committee on Interior and Insular Affairs (U. S. Senate).
THE NATIONAL COAL CONVERSION ACT AND THE NATIONAL CRUDE OIL REFINERY DEVELOPMENT ACT
Washington GPO 1974 249 p refs Hearing on S. 2652 and S. 2743 before Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., 10 Dec. 1973
(GPO-28-964) Avail: Comm. on Interior and Insular Affairs

Aspects of two bills, one to authorize the President to require certain power plants and industrial facilities to convert to the use of domestic coal as their primary fuel source, and the other to authorize a loan guarantee program designed to stimulate increased petroleum refining capacity, were debated before Congress. Environmental concerns were included during the discussion, and details were given on flue gas desulfurization technology, a method of controlling sulphur oxide emissions from coal and oil burning electric power plants. A.A.D.

N75-10862# Committee on Commerce (U. S. Senate).
METRIC CONVERSION ACT OF 1973
Washington GPO 1974 93 p refs Hearing on S. 100 before Comm. on Commerce, 93d Congr., 1st Sess., 2 Nov. 1973
(GPO-27-065) Avail: Comm. on Commerce

Congressional hearings are presented on the Metric Conversion Act of 1973 to provide a national program in order to make the international metric system the predominant but not exclusive system of measurement in the U.S. and to provide for converting to the general use of such a system within ten years. The impact that this system will have on various businesses and economic levels is also considered. J.A.M.

N75-10863# Committee on Interstate and Foreign Commerce (U. S. House).
NEW MOTOR VEHICLE EMISSION STANDARDS AND FUEL ECONOMY
Washington GPO 1974 559 p refs Hearings before Subcomm. on Public Health and Environment of Comm. on Interstate and Foreign Commerce, 93d Congr., 1st Sess., 3-5 Dec. 1973
(GPO-29-272) Avail: Subcomm. on Public Health and Environment

Proposals to amend title 2 of the Clean Air Act emission standards for moving sources were considered in a Congressional hearing whose dual purpose was to provide a realistic schedule for automotive industry compliance with emission control standards, while considering the adverse effects on the environment implicit in any delay of such compliance. The penalties in fuel consumption caused by clean air standards are also discussed. An overview of U.S. refining capability to support proposed changes in motor gasolines is provided, along with an assessment of emission rates for each feasible emission control procedure. A.A.D.

N75-10864# Committee on Public Works (U. S. Senate).
IMPLEMENTATION OF THE NOISE CONTROL ACT OF 1972 (AIRCRAFT-AIRPORT NOISE), PART 2
Washington GPO 1974 91 p Hearing before Subcomm. on Environ. Pollution of Comm. on Public Works, 93d Congr., 2d Sess., 22 Mar. 1974
(GPO-33-871) Avail: Subcomm. on Environ. Pollution

Noise abatement flight procedures, noise source emissions control, and airport area noise reduction were identified in a Congressional hearing as the three complimentary areas of research and development that are necessary for effective compliance with the Noise Control Act of 1972. Actions taken by EPA in conjunction with FAA, are reviewed, including proposals which encompass the following areas: (1) core engine noise control; (2) configurational effects on noise; (3) retrofit feasibility for commercial and executive jet aircraft; (4) V/STOL jet and rotary propulsor noise control; (5) noise measurement systems; (6) noise exposure evaluation and community response; (7) noise certification criteria; and (8) sonic boom reduction and control. A.A.D.

N75-10865*# Scientific Translation Service, Santa Barbara, Calif.
INTERNATIONAL SPACE LAW
A. S. Piradov, ed. Washington NASA Oct. 1974 306 p refs Transl. into ENGLISH of the book "Mezhdunarodnoye Kosmicheskoye Pravo" Moscow, Izdatelstvo Mezhdunarodnyye Otnosheniya, 1974 286 p
(Contract NASw-2483)
(NASA-TT-F-15912) Avail: NTIS HC $9.25 CSCL 05D

The legal aspects of the exploration and use of outer space and celestial bodies are discussed, and a complete bibliography of the works of Soviet lawyers on international space law is provided. Author

N75-10866# Committee on Ways and Means (U. S. Senate).
OIL AND GAS ENERGY TAX ACT OF 1974
Mills Washington GPO 1974 28 p Supplemental rept. to accompany H.R. 14462 of the Comm. on Ways and Means, 93d Congr., 2d Sess., 10 Jun. 1974
(H-Rept-93-1028-Pt-2; GPO-99-081) Avail: US Capitol, House Document Room

Changes to be made in the existing Internal Revenue Code, upon implementation of the proposed Oil and Gas Energy Tax Act of 1974, are designated in a report to Congress. Items specifically covered include normal taxes and surtaxes, allowable deductions, and items not deductible, such as intangible drilling and development costs. Special guidelines refer to natural resource depletion allowances and foreign tax credit. A.A.D.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N75-10867# Royal Aircraft Establishment, Farnborough (England).
CABTRACK: COMMUNICATIONS AND CONTROL INSTRUMENTATION FOR A ONE-FIFTH SCALE TEST TRACK
E. W. Gibbs and H. C. Leedham Mar. 1974 45 p refs
(RAE-TR-73169; BR39806) Avail: NTIS HC $3.75

Cabtrack is a proposed high-density urban transport system in which four seat electrically powered vehicles run on a network of segregated tracks under automatic control. A principle of position-lag slot control is discussed whereby vehicles would operate in synchronism with each other on main tracks, but change to asynchronous operation after diverting into a station loop. A one-fifth scale model cabway was constructed to develop and test the methods of control. The communication and control instrumentation which was developed to enable up to 14 cabs to operate under the control of a small digital computer is described. The model cabway was successfully operated with 6 cabs of length 66 cm running at 2 m/s with headways of 54 cm (equivalent to a flow of 4000 cabs per hour on a track which is 70% occupied) thereby demonstrating a viable system of control which could be developed for use with various types of vehicle on segregated tracks. Author (ESRO)

N75-10868# Transport and Road Research Lab., Crowthorne (England). Urban Transport Div.
AN ANALYSIS OF SOME WORLD TRANSPORT STATISTICS
A. H. Tulpule 1974 51 p refs
(PB-232940/7; TRRL-LR-622) Avail: NTIS HC $5.75 CSCL 13F

The main purpose of the report is to present a broad picture of trends in world passenger and goods transport by mechanical means since 1950. Estimates of passenger kilometers and ton-kilometers by road for each region are made and the trends in road transport are compared with trends in transport by rail, air and sea. The report also gives an indication of possible future

growth in world transport on the basis of past trends and assumptions about future developments. GRA

88 SPACE SCIENCES (GENERAL)

N75-10869# Joint Publications Research Service, Arlington, Va.
STATUS AND PROSPECTS OF DEVELOPMENT OF SPACE GEODESY
A. A. Izotov 18 Oct. 1974 16 p Transl. into ENGLISH from Geod. i Kartografiya (Moscow), no. 5, 1974 p 10-18
(JPRS-63231) Avail: NTIS HC $3.25

The developments in space geodesy for studying the earth and circumterrestrial space are reviewed. Author

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N75-10870 Rochester Univ., N.Y.
OUTER LAYERS OF WHITE DWARF STARS Ph.D. Thesis
Gilles Fontaine 1974 236 p
Avail: Univ. Microfilms Order No. 74-22578

Models of white dwarf envelopes were constructed in the range -4.0 is less than or equal to log L is less than or equal to -1.5 and 0.220 is less than or equal to M is less than equal to 1.220 taking into account the possible existence of convection. The input data were opacity tables for mixtures representative of white dwarf stars (low metal content), and equation of state tables. Most of the models had some fraction of the envelope in convection. Above a certain critical luminousity, convection disappears. For lower luminousities, convection becomes increasingly efficient and the transition to 100% efficiency is very rapid. At still lower luminosities, the convection becomes adiabatic, and independent of the mixing-length. Only convective solutions reaching the degenerate core affect the total energy content of the star. Results indicate that convection decreases the core temperatures by at most 50% in the physical models. Dissert. Abstr.

N75-10871 Pennsylvania State Univ., University Park.
THEORETICAL INVESTIGATION OF STELLAR ATMOSPHERES WITH SPECIFIC APPLICATION TO THE ATMOSPHERE OF A CARBON STAR R CORONAE BOREALIS Ph.D. Thesis
Kiyoshi Kawabata 1973 402 p
Avail: Univ. Microfilms Order No. 74-20931

A fine analysis of the hydrogen-deficient carbon star, R Coronae Borealis, was undertaken to study the change in the atmospheric structure for stars with anomalous chemical compositions. To facilitate the treatment of the line spectra for late type stars, the variation of the blended line intensity is considered for two typical cases, viz., a weak line on the wing of an extremely strong line, and the blending of two comparable lines. The blending effect is then found to diminish very rapidly with the increasing of the separation of the two lines. It is shown that the microturbulent velocity is a highly important parameter for the blending effect. A significant improvement over the results previously obtained is noticed in the intensity of a weak line on the wing of a broad line predicted by the detailed calculations presently made. A discussion on a convenient method to determine the continuum location inside a broad line proposed by Matsushima and Kawabata (1972) on the basis of the results of such study is also given. Dissert. Abstr.

N75-10872 Dartmouth Coll., Hanover, N.H.
THE OPTICAL SPECTRUM OF SCO X-1 Ph.D. Thesis
Richard James Messina 1974 356 p
Avail: Univ. Microfilms Order No. 74-23084

The optical spectrum of Sco X-1 is analyzed in the optical line-emitting region. The data consist of spectroscopic, B-magnitude, and photometric observations. The observed widths of the principal lines in Sco X-1 are examined, and electron density values are derived. Methods of determining the temperature of the optical line emitting plasma are considered, and a characteristic electron temperature of approximately 55,000 K is suggested. Examples of the spectroscopic variability of the object are presented for selected spectral sequences. The hydrogen lines show more pronounced changes in strength and profile than does He 11. The Balmer decrement is corrected for the effects of interstellar reddening, and the origins of the observed changes in the Balmer decrement are discussed along with models of Sco X-1. Dissert. Abstr.

N75-10873 California Univ., Santa Cruz.
OBSERVATIONS OF LITHIUM DILUTION AND ROTATIONAL VELOCITY DECAY IN F AND G GIANT STARS Ph.D. Thesis
William Richard Alschuler 1974 46 p
Avail: Univ. Microfilms Order No. 74-20488

Li abundances and rotational velocities have been determined for about 70 stars between F4 III and G5 III, from Lick coude image tube spectrograms of dispersion 16A/mm. These results can be compared with theoretical predictions of Li convective dilution and rotational velocity decay for masses 2.4 to 3.0 solar mass. If all these stars are crossing the Hertzsprung Gap for the first time since leaving the main sequence, then theory and observation do not entirely agree. A satisfactory agreement with observation could be achieved by adjustments to the models, possibly through a modification of the mixing-length theory of convection. Without such modifications it would be necessary to assume that there is a systematic increase in the sampled mean mass between F4 III and G5 III, which implies that these samples are drawn from different regions of the ZAMS having different initial Li abundances. Dissert. Abstr.

N75-10874 California Univ., Davis.
A NUMERICAL STUDY OF PROTOSTELLAR FORMATION Ph.D. Thesis
Charles Knowlton Westbrook 1974 96 p
Avail: Univ. Microfilms Order No. 74-21640

The protostellar evolution of gas clouds is examined. A mathematical model is presented, treating all of the physical processes which are important during protostar formation, including hydrodynamics, thermodynamics and equation of state, radiation transport, and convective energy transport. The stellar structure equations were cast into the form of an initial value problem that can be evolved in time. A numerical model was then developed. The difference equations evolve configurations which are far from radiative, convective, or hydrodynamic equalibrium. The results of evolutionary calculations are consistent with the existence of a lower mass limit for formation of main sequence stars. Other results for large mass clouds demonstrate mechanisms which severely limit the maximum size for stable stars. Convective energy transport was treated with an extended mixing length theory. A numerical model is developed for material in hydrostatic equilibrium, coupling implicitly all of the stellar structure equations into one system. Dissert. Abstr.

N75-10875*# Systems Research Lab., Champaign, Ill.
MODERN SAMPLED-DATA CONTROL THEORY: DESIGN OF THE LARGE SPACE TELESCOPE Final Report
B. C. Kuo and G. Singh Washington NASA Sep. 1974 133 p refs
(Contract NAS8-29853)
(NASA-CR-2457) Avail: NTIS HC $5.75 CSCL 20F

This investigation was undertaken to determine the effect of varying the sampling period on the dynamic response of the sampled-data Large Space Telescope (LST) system. A range of sampling periods was recommended based on the criterion that self-sustained oscillations are to be avoided in the LST system. The step responses of the LST system were then investigated when various sampling periods are used. For small sampling periods, the dynamic behavior of the sampled-data system is very similar to that of the continuous-data system. When T is large (but less than 0.25 sec) the overshoot of the step response of the sampled-data becomes greater. However, the dynamic behavior of the sampled-data system may be improved by

redesigning the controller. It appears that a sampling period as high as 0.1 second is feasible for the LST system. However, it should be noted that the conclusions are obtained with the existing system model. Other practical considerations such as noise, coupling effects and quantization errors, may restrict the sampling period to a lower value. Author

N75-10876*# State Univ. of New York, Genesco. Dept. of Physics and Astronomy.
A COMPARISON OF LYMAN ALPHA AND He LAMBDA 10830 LINE STRUCTURES AND VARIATIONS IN EARLY-TYPE STAR ATMOSPHERES Final Technical Report, Jan. - Oct. 1974
David D. Meisel Oct. 1974 27 p refs
(Grant NGR-33-219-002)
(NASA-CR-140572) Avail: NTIS HC $3.75 CSCL 03A

Line profiles were first obtained at maximum velocity separation of the spectroscopic binary Spica (alpha Vir), and then high resolution spectrophotometric images of selected features in the 1.1 micron spectrum of Comet Kohoutek were obtained in order to gain insight into the structures and variations in early-type star atmospheres. Author

N75-10877*# California Univ., Berkeley.
HIGH ANGULAR RESOLUTION AND POSITION DETERMINATIONS BY INFRARED INTERFEROMETRY
4 Nov. 1974 32 p refs
(Grant NGR-05-003-402)
(NASA-CR-140670) Avail: NTIS HC $3.75 CSCL 03A

Interferometer systems are described in the form of publications and reports. 'Distance Meter Helps Track the Stars', 'Berkeley Heterodyne Interferometer', 'Infrared Heterodyne Spectroscopy of CO2 on Mars', and 'A 10 micron Heterodyne Stellar Interferometer' are papers reported. M.C.F.

N75-10878*# Princeton Univ. Observatory, N.J.
APPLICATION OF DIGITAL COMPUTER TECHNIQUES TO RECTIFICATION AND ENHANCEMENT OF ASTRONOMICAL IMAGES Final Report
R. E. Danielson 5 Nov. 1974 8 p refs
(Grant NGR-31-001-142)
(NASA-CR-140701) Avail: NTIS HC $3.25 CSCL 03A

An image processing program is reported to analyze the high resolution images obtained by the balloon borne 36 in. diameter stratoscope 2 telescope. A film recording device is described which is capable of converting numerical data from the computer into photographic images. M.C.F.

N75-10879*# Hale Observatories, Pasadena, Calif.
ABSOLUTE SPECTROPHOTOMETRY IN M31 AND M32
J. B. Oke and M. Schwarzschild (Princeton Univ. Obs.) [1974] 25 p refs
(Grant NGL-05-002-134)
(NASA-CR-140683) Avail: NTIS HC $3.25 CSCL 03A

For a number of places in the bulge of M31 and for two places in M32 photometric scans from 3300 A to 10,600 A have been obtained with the multichannel spectrometer on the 5-meter Hale telescope. The scans show that in both objects the color temperature (particularly shortwards of 5000 A) decreases towards the center and that the strength of the CN bands increases towards the center in both objects in agreement with earlier observations. The new data can all be interpreted in terms of an increase of heavy element abundance towards the center in both objects by a factor probably less than 2 and by an excess of heavy elements in M31 compared to M32 by a factor probably greater than 2, in qualitative agreement with earlier conclusions. Author

N75-10880# Max-Planck-Institut fuer Physik und Astrophysik, Munich (West Germany). Inst. fuer Extraterrestrische Physik.
CALCULATION OF NO AND CO MOLECULAR SPECTRA IN THE COMA OF A COMET [BERECHNUNG VON SPEKTREN DER MOLEKUELE NO UND CO IN DER KOMA EINES KOMETEN]
Gerhard F. Moeller May 1974 97 p refs In GERMAN
(MPI-PAE/Extraterr-98) Avail: NTIS HC $4.75

The ultraviolet spectrum of the 1973F Comet Kohoutek was the subject of calculations on spectral bands of CO and NO molecules under conditions thought to prevail in the coma of a comet. The degree of occupation of the excited states was determined by solving an extensive systems of equations in which problems arose because of the omission of the higher excited levels. It is shown that by making a suitable choice of normalization conditions, the resulting error can be kept very small. ESRO

N75-10881# Naval Postgraduate School, Monterey, Calif.
SIMULATION OF REDSHIFTS IN HYDROGEN BY PERTURBATIONS M.S. Thesis
James Roger Meyer Jun. 1974 33 p refs
(AD-783776) Avail: NTIS CSCL 03/2

The problem of explaining the redshifts in the spectra of quasi-stellar objects is considered by using first-order quantum perturbation theory to examine classes of perturbing Hamiltonians to determine if they could cause a redshift in the spectrum of hydrogen. A method is developed for deriving necessary conditions that a perturbation must satisfy to yield a redshift and conclusions are given for several types of perturbations. (Modified author abstract) GRA

N75-10882*# Hale Observatories, Pasadena, Calif.
INFRARED, RADIO, AND X-RAY OBSERVATIONS OF CYGNUS X-3
E. E. Becklin, F. J. Hawkins (Mullard Space Sci. Lab.), K. O. Mason (Mullard Space Sci. Lab.), K. Matthews, G. Neugebauer, D. Packman, P. W. Sanford (Mullard Space Sci. Lab.), B. Schupler, A. Stark, and C. G. Wynn-Williams (Mullard Radio Astronomy Obs.) 1974 25 p refs
(Contract N00014-67-A-0094-0019; Grants NGL-05-002-207; NSF GP-30400-X2; NSF GP-23780; NSF GP-35545X)
(NASA-CR-140680; AD-784439) Avail: NTIS HC $3.25 CSCL 03/2

The X-ray source Cygnus X-3 has been interpreted as being a binary system on the basis of extensive X-ray observations of periodic variability. At radio wavelengths, the source displays erratic outbursts. Cyg X-3 has not been detected visually but at infrared wavelengths periodic variations in phase with the X-ray variations have been reported. Infrared, X-ray and radio observations of Cyg X-3 made during 1973 through 1973 October are presented. GRA

N75-10883# Owens Valley Radio Observatory, Pasadena, Calif.
RADIO RECOMBINATION LINE OBSERVATION OF THE CII REGION NGC2023
Gillian R. Knapp, Robert L. Brown, and Tom B. H. Kuiper 1974 36 p refs
(Contract N00014-67-A-0094-0019)
(AD-783983; Rept-1974-9) Avail: NTIS CSCL 03/2

The reflection nebula NGC 2023 has been observed at four frequencies in a study of its carbon recombination line emission. The observations show the recombination line region to be about 2 pc in diameter, with an average electron density of approximately 0.2/cc and electron temperature of approximately 20K. The electron density increases exponentially near the B1.5 star HD37903, the illuminating star of NGC 2023. The most reasonable interpretation of the observational results is that the carbon emission lines arise in a cold CII region surrounding HD37903. The coexistence of the CII region with a region of enhanced CO emission suggests that the CO in NGC 2023 may be excited by electron collisions. Author (GRA)

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N75-10884*# Scientific Translation Service, Santa Barbara, Calif.
ASTROMETRY AND ASTROPHYSICS
V. I. Voroshilov, ed. Washington NASA Sep. 1974 171 p refs Transl. into ENGLISH of the book "Astrometriya i Astrofizika" Kiev, Naukova Dumka Press, Issue 18, 1973 101 p
(Contract NASw-2483)
(NASA-TT-F-15767) Avail: NTIS HC $6.25 CSCL 03B

Articles concerning fundamental astrometry, photometry, and

spectrophotometry of the stars and solar, planetary, and cometary physics are presented. Author

N75-10885# Owens Valley Radio Observatory, Pasadena, Calif.
MODELS OF MASSIVE MOLECULAR CLOUDS
B. Zuckerman and N. J. Evans, II 1974 14 p refs Prepared in cooperation with Maryland Univ., College Park
(Contract N00014-67-A-0094; Grants NSF GP-26218; NSF GP-30400)
(AD-780922/1; Rept-1974-7) Avail: NTIS HC $3.00 CSCL 03/2

Observations of carbon monoxide lines from massive molecular clouds, such as those near Orion A and Sgr B2, have recently been interpreted in terms of large scale motions, generally collapse or expansion, that imply rapid evolution of these clouds. The authors suggest an alternative explanation: the clouds are not dominated by large scale systematic motions and the CO profiles are determined primarily by local motions. Therefore, it is generally not possible to see through these clouds in optically thick lines of molecules such as CO and HCN. Some consequences and tests of this model are briefly discussed. Author (GRA)

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N75-10886*# Scientific Translation Service, Santa Barbara, Calif.
EARTH - SPACE - MOON
S. N. Minchin and A. T. Ulubekov Washington NASA Sep. 1974 304 p refs Transl. into ENGLISH of the book "Zemlya - Kosmos - Luna" Moscow, Mashinostroyeniyee Press, 1972 244 p
(Contract NASw-2483)
(NASA-TT-F-800) Avail: NTIS HC $9.25 CSCL 03B

The history of man's study of the moon, primarily with the aid of space vehicles is presented. Data on the moon based on the use of observational equipment on the earth are presented. The physical and chemical properties, surface relief, soil structure, and other features of the moon are analyzed. Author

N75-10887*# Scientific Translation Service, Santa Barbara, Calif.
ORBITAL GEOLOGY
V. Brukhanov Washington NASA Oct. 1974 5 p Transl. into English from Izv. (Moscow), no. 173, 25 Jul. 1974 p. 2
(Contract NASw-2483)
(NASA-TT-F-16000) Avail: NTIS HC $3.25 CSCL 03B

The use of satellites in space to determine geological features on the earth is analyzed and discussed with emphasis on geological advances in space technology. Author

N75-10888*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
PIONEER 10: OBSERVATIONS OF ENERGETIC ELECTRONS IN THE JOVIAN MAGNETOSPHERE
B. A. Randall Jun. 1974 43 p refs Presented at the Neil Brice Memorial Symp. on Magnetospheres, Frascati, Italy, 28 May - 1 Jun. 1974
(Contracts NAS2-5603; N00014-68-A-0196-0009)
(NASA-CR-140676; U-of-Iowa-74-26; AD-783679) Avail: NTIS HC $3.75 CSCL 03/2

Results are given of a study of the intensities, energy spectra, and angular distribution of energetic particles in the magnetosphere of Jupiter; the heliocentric radial gradient of the intensity of galactic cosmic rays; and the occurrence, intensity, and angular distribution of solar flare particles and their propagation through the interplanetary medium at large heliocentric distances. GRA

N75-10889*# California Univ., Los Angeles. Plasma Physics Group.
IS JUPITER'S MAGNETOSPHERE LIKE A PULSAR'S OR EARTH'S?
C. F. Kennel and F. V. Coroniti Sep. 1974 67 p refs
(Grant NGL-05-007-190)
(NASA-CR-140600; Publ-1353; PPG-188) Avail: NTIS HC $4.25 CSCL 03B

The application of pulsar physics to determine the magnetic structure in the planet Jupiter outer magnetosphere is discussed. A variety of theoretical models are developed to illuminate broad areas of consistency and conflict between theory and experiment. Two possible models of Jupiter's magnetosphere, a pulsar-like radial outflow model and an earth-like convection model, are examined. A compilation of the simple order of magnitude estimates derivable from the various models is provided. Author

N75-10890*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MARINER MARS 1971 TELEVISION PICTURE CATALOG. VOLUME 1, ADDENDUM 1: EXPERIMENT DESIGN AND PICTURE DATA
Dennis Crosby 15 Aug. 1974 87 p
(Contract NAS7-100)
(NASA-CR-140700; JPL-TM-33-585-Vol-1-Add-1) Avail: NTIS HC $4.75 CSCL 03B

Footprint plots of the Mariner 9 television mapping of the Martian surface from Rev 100 through Rev 676, and catalogs of the pictures and their quadrangle locations are presented. Author

N75-10891*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
PHYSICAL AND DYNAMICAL STUDIES OF METEORS Special Progress Report, 1 Feb. - 30 Nov. 1973
Richard B. Southworth and Zdenek Sekanina Jun. 1974 38 p refs
(Contract NAS1-11204)
(NASA-CR-132534; SAO-406-057) Avail: NTIS HC $3.75 CSCL 03B

Distribution of meteors in streams detected in the synoptic-year meteor sample plus a study of the fragmentation characteristics of the synoptic-year meteor sample are presented. Population coefficients and dispersion coefficients were determined for each meteor stream. These two parameters serve to determine the number of definite members of the stream in the sample used, and to estimate the actual space density of meteor streams. From results of the fragmentation study, it appears that the main body of most radar meteors does not ablate fragments layer by layer, but collapses rather suddenly under dynamic pressures on the order of 0.0002 dynes/cm. Furthermore, it is believed that fragmentation does not cause a serious selection effect in the radar meteor data. Author

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N75-10892*# Lockheed Missiles and Space Co., Palo Alto, Calif. Radiation Physics Lab.
COORDINATED ROCKET AND SATELLITE OBSERVATIONS OF THE SOLAR CORONA Final Report
W. T. Zaumen Jul. 1974 11 p refs
(Contract NASw-2589)
(NASA-CR-140581; LMSC-D404808) Avail: NTIS HC $3.25 CSCL 03B

Coronal condensations associated with active regions are investigated by comparing their X-ray and EUV line intensities. The EUV line measurements were made with the OSO-H satellite, and the X-ray measurements were made with an ATM support rocket. The data obtained from these observations are used to find the emission measure distribution at low temperatures. M.C.F.

N75-10893*# Stanford Univ., Calif.
TERMINATION OF THE SOLAR WIND IN THE HOT, PARTIALLY IONIZED INTERSTELLAR MEDIUM Ph.D. Thesis

Charles Klem Lombard Nov. 1974 152 p refs
(Grants NGR-05-020-330; NSF GA-3761)
(NASA-CR-140699) Avail: NTIS HC $6.25 CSCL 03B

Theoretical foundations for understanding the problem of the termination of the solar wind are reexamined in the light of most recent findings concerning the states of the solar wind and the local interstellar medium. The investigation suggests that a simple extention of Parker's (1961) analytical model provides a useful approximate description of the combined solar wind, interstellar wind plasma flowfield under conditions presently thought to occur. A linear perturbation solution exhibiting both the effects of photoionization and charge exchange is obtained for the supersonic solar wind. A numerical algorithm is described for computing moments of the non-equilibrium hydrogen distribution function and associated source terms for the MHD equations. Computed using the algorithm in conjunction with the extended Parker solution to approximate the plasma flowfield, profiles of hydrogen number density are given in the solar wind along the upstream and downstream axes of flow with respect to the direction of the interstellar wind. Predictions of solar Lyman-alpha backscatter intensities to be observed at 1 a.u. have been computed, in turn, from a set of such hydrogen number density profiles varied over assumed conditions of the interstellar wind. Author

N75-10894*# Stanford Univ., Calif.
DYNAMICS OF THE SOLAR WIND AND ITS INTERACTION WITH BODIES IN THE SOLAR SYSTEM Final Report
[1974] 7 p refs
(Grant NGR-05-020-330)
(NASA-CR-140702) Avail: NTIS HC $3.25 CSCL 03B

The results of the research related to solar winds are presented. Also included is a summary of papers and publications completed. M.C.F.

N75-10895# Sandia Labs., Albuquerque, N.Mex.
ROCKET OPERATIONS PLAN. AUSTRALIAN ECLIPSE JUNE 1974
Mar. 1974 67 p
(Contract AT(29-1)-789)
(SLA-74-117) Avail: NTIS HC $4.25

The temperature structure and density distribution of the solar corona from the limb out to about one solar radius above the limb were measured during the total solar eclipse of June 20, 1974. The measurements will help to understand the physical processes of energy transfer from the photosphere outward into the solar corona and the solar wind. Exoatmospheric observations will be made by a high resolution spectrograph, which will measure the width of the Lyman-alpha line of neutral hydrogen in the solar corona and will be launched near Perth to an altitude of 320 km. Airborne and ground-based observations will be coordinated. NSA

N75-10896# Max-Planck-Institut fuer Physik und Astrophysik, Munich (West Germany). Inst. fuer Extraterrestrische Physik.
NUCLEAR COMPOSITION OF SOLAR COSMIC RAYS
Dietrich Hovestadt Jul. 1974 42 p refs Presented at the Solar Wind Conf., Asilomar, Calif., Mar. 1974
(MPI-PAE/Extraterr-101) Avail: NTIS HC $3.75

The elemental and isotopic composition of flare particles as well as the composition of quiet time cosmic rays at very low energies are discussed. Surveys are presented of the characteristics of particle emitting flares, and experimental techniques for the separation of flare particle species. The elemental composition of flare accelerated particles is split into the proton to alpha ratio, heavy elements of Z more than 2, and ionic charges. Several possibilities of charge to mass ratios with respect to models explaining the heavy particle enhancement are discussed. The relationship between isotopic composition and nuclear reations is examined. Abundances relating to solar quiet time energy spectra are considered. ESRO

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N75-10897 Washington Univ., St. Louis, Mo.
THE COMPOSITION OF COSMIC RAYS WITH Z GREATER THAN OR EQUAL TO 12 Ph.D. Thesis
Ronald Charles Maehl 1974 261 p
Avail: Univ. Microfilms Order No. 74-22535

Cosmic ray results obtained from two high altitude balloon flights of a large area electronic primary cosmic ray detector, consisting of fast pulse-type ionization chambers, a Lucite Cerenkov counter, and scintillation hodoscopes to measure the charge, energy and isotopic composition of cosmic rays with zeta greater than or equal to 12 are reported. Dissert. Abstr.

N75-10898 Colorado Univ., Boulder.
ACCRETION FLOWS ONTO GALACTIC X-RAY SOURCES Ph.D. Thesis
James Steve Buff 1974 208 p
Avail: Univ. Microfilms Order No. 74-22323

Gas flows onto galactic X-ray sources were investigated with several simple models. The temperature and ionization state of the gas is found by requiring local balance of heating and ionization. Radiative transfer is performed to find the X-ray spectrum. Spherically symmetric accretion flows in the presence of a strong X-ray source are discussed. The mass accretion rate is regulated by the location of the sonic surface, which depends on X-ray luminosity and spectrum. Radiation pressure on the gas due to photoionization may exceed that due to Compton scattering by a large factor and reduce the limiting luminosity below the Eddington limit. The preferential absorption of soft X-rays is evident in the emergent X-ray spectrum. Some of the absorbed radiation appears as optical and ultraviolet emission lines. The results obtained from the spherically symmetric models are applied to more complex models in a qualitative way. Dissert. Abstr.

N75-10899*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE VARIATION OF SOLAR PROTON ENERGY SPECTRA SIZE DISTRIBUTION WITH HELIOLONGITUDE
M. A. I. VanHollebeke (Maryland Univ., College Park), L. S. MaSung (Maryland Univ., College Park), and F. B. McDonald Sep. 1974 72 p refs
(NASA-TM-X-70770; X-660-74-298) Avail: NTIS HC $4.25 CSCL 03B

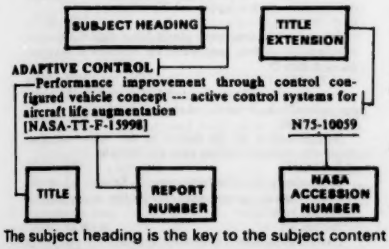
A statistical study of the initial phases of 185 solar particle events was carried out using the data from cosmic ray experiments on IMP 4 and IMP 5. Special emphasis was placed on the identification of the associated solar flare, as the parent flare can be determined for 68% of the events. It appears probable that most of the unidentified increases occur on the non-visible disc of the sun. The existence of a 'preferred-connection' longitude between 20 W and 80 W was established by examining the heliolongitude of all the flare associated events. It is demonstrated that the energy spectra determined at the time of maximum particle in the 20 to 80 MeV or 4 to 20 Mev interval range give results identical to that obtained by the 'distance-travelled' method. Author

99 GENERAL

No abstracts in this category.

SUBJECT INDEX

TYPICAL SUBJECT INDEX LISTING



The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7040).

A

ABLATIVE MATERIALS
Aerospace Research --- topics on airfoil profiles, flow visualization, ablative materials, microanalysis, and filter analysis
[ESRO-TT-90] N75-10011
An experimental study of the thermal decomposition of an ablative material
N75-10015

ABSORPTION SPECTRA
Picosecond flash photolysis and spectroscopy: Bis-[4-dimethylaminodithiobenzil]--Ni[2], [BDN] --- transient absorption spectrum
[AD-781925] N75-10199
Emission and absorption lines of QSOs and properties of the gas that produces them
N75-10763

ABSTRACTS
Air pollution translations: A bibliography with abstracts, volume 5
[PB-233374/8] N75-10619

ACCELERATED LIFE TESTS
Development of accelerated life testing techniques for general failure modes of aircraft hardware
[AD-784188] N75-10073
Accelerated lifetesting of thin film tungsten contacts for a milliwatt Si-Ge thermopile --- temperature effect on sputter deposited layers
[SLA-73-1087] N75-10471
Present-day status of accelerated testing of trimming potentiometers
[ESRO-CR-167] N75-10472
Present-day status of accelerated testing of fixed capacitors
[ESRO-CR-168] N75-10473
Present-day status of accelerated testing of integrated circuits
[ESRO-CR-169] N75-10474
Present day status of accelerated testing of diodes and transistors
[ESRO-CR-170] N75-10475
Present-day status of accelerated testing of fixed resistors
[ESRO-CR-166] N75-10478

ACCELERATION STRESSES (PHYSIOLOGY)
The generation of saccadic eye movements in vestibular nystagmus --- computerized simulation of nystagmic response to acceleration
[AD-784128] N75-10700
Models of subjective response to in-flight motion data
[NASA-CR-140675] N75-10708

ACCURACY
The geometrical accuracy of electrical wires and the interference effects on small measuring objects
[FOA-2-C-2539-D4] N75-10415

ACOUSTIC DELAY LINES
Burst processor tapped delay line --- Doppler resolution filter
[AD-779473] N75-10331

ACOUSTIC IMPEDANCE
Acoustic grazing flow impedance using waveguide principles
[NASA-CR-120848] N75-10351
Ultrasonic absorption by phospholipid vesicles; acoustic impedance matching and the design of broadband piezoelectric transducers
N75-10751

ACOUSTIC PROPERTIES
Self-excited superturbulence: The whistler nozzle
[RE-488] N75-10363
Acoustical studies of sound-producing sands --- acoustic properties of sand grains under compression loads
[NASA-TT-F-15715] N75-10752

ACOUSTIC SCATTERING
Sound turbulence interaction
[TT-7404] N75-10754
Acoustic scattering from a sphere with nonuniform surface impedance --- mathematical method for computing overpressure in near and far fields
[AD-783805] N75-10757

ACOUSTO-OPTICS
Underwater applications of acousto-optical imaging
[AD-784419] N75-10759

ACTIVATION ENERGY
Critical energy for shock initiation of tetryl and A-5
[UCID-16469] N75-10260

ACTIVITY CYCLES (BIOLOGY)
The effects of lunar cycles and diurnal rhythms on activity, exploration, and elicited aggression in rats and mice
N75-10677

ADAPTIVE CONTROL
Performance improvement through control configured vehicle concept --- active control systems for aircraft life augmentation
[NASA-TT-F-15998] N75-10059

ADAPTIVE FILTERS
A practical on-line filter to process gyrocompass data
[AD-783250] N75-10048

ADHESION
The influence of surfactants on the adhesion between solids --- measurement of force of adhesion between crossed carbon filaments submerged in an aqueous buffer solution
N75-10254

ADSORPTION
Influence of gas particles adsorbed on the solid surface and influence of structure on the gas-solid interaction measured by molecular beam scatter
[ESRO-TT-84] N75-10235

AERIAL PHOTOGRAPHY
Some problems of aerial photographic surveying employing color and spectrozonal photographic materials
[AD-784147] N75-10430
Comparison of various methods of flight-line three-dimensional analytic phototriangulation
[AD-783662] N75-10574
The PUCE programme for terrain evaluation for engineering purposes. 2: Procedures for terrain classification
[PB-233847/3] N75-10625

AERIAL RECONNAISSANCE
Pattern recognition relevant to reconnaissance and remote sensing --- noting classification methods
[PHL-1974-23] N75-10573

AERODYNAMIC CHARACTERISTICS
Hingeless rotorcraft flight dynamics --- research projects to analyze aerodynamic characteristics of rotary wings
[AGARD-AG-197] N75-10003
Determination of aerodynamic derivatives using the discrete Fourier transformation of transient oscillations
[DLR-FB-74-17] N75-10018
Aerodynamic results of support system interference effects tests conducted in NASA/ARC 6 by 6-foot supersonic wind tunnel using an 0.015-scale model of the configuration 140A/B SSV orbiter [OA59], volume 1
[NASA-CR-134410] N75-10108
Aerodynamic results of support system interference effects tests conducted in NASA/ARC 6 by 6-foot supersonic wind tunnel using a 0.015 scale model of the configuration 140A/B SSV orbiter, volume 2
[NASA-CR-134412] N75-10109
Effects of reaction control system jet flow field interactions on the aerodynamic characteristics of a 0.010-scale space shuttle orbiter model in the Langley Research Center 31 inch CFHT [OA85]
[NASA-CR-134111] N75-10148
Results of an investigation of hypersonic viscous interaction effects on an 0.01 scale space shuttle orbiter 51-0 model in the AEDC-VKE hypervelocity wind tunnel
[NASA-CR-134423] N75-10360

AERODYNAMIC COEFFICIENTS
Extraction from flight data of lateral aerodynamic coefficients for F-8 aircraft with supercritical wing
[NASA-TN-D-7749] N75-10006
Influence of the viscous interaction parameter on the aerodynamic coefficients and on the heat transfer of a reentry body at very low densities for the whole region of angle of attack
[ESRO-TT-95] N75-10387

AERODYNAMIC CONFIGURATIONS
Wind tunnel tests of modified cross, hemisflo, and disk-gap-band parachutes with emphasis in the transonic range
[NASA-TN-D-7759] N75-10007
Application of the polar coordinate method to oscillating wing configurations
[SAAB-TN-69] N75-10010
High acceleration cockpits for advanced fighter aircraft. Volume 4: Test results
[AD-783603] N75-10067
Highly loaded multi-stage fan drive turbine: Performance of final three configurations
[NASA-CR-2446] N75-10089
Effect of ELEVON gap configurations on the longitudinal stability and control effectiveness of the 43-0 space shuttle orbiter [OA118]
[NASA-CR-134407] N75-10152
A viscous/potential flow interaction analysis method for multi-element infinite swept wings, volume 1
[NASA-CR-2476] N75-10358

AERODYNAMIC FORCES
Wind tunnel tests of modified cross, hemisflo, and disk-gap-band parachutes with emphasis in the transonic range
[NASA-TN-D-7759] N75-10007
Application of the polar coordinate method to oscillating wing configurations
[SAAB-TN-69] N75-10010
Aerodynamic symmetry of aircraft and guided missiles --- development of configurations to eliminate certain force and moment derivatives
[AD-784254] N75-10070
Performance and exit distortion of diffusers as determined by force measurements --- using laminar inlet boundary layers
N75-10361

AERODYNAMIC HEAT TRANSFER
Influence of the viscous interaction parameter on the aerodynamic coefficients and on the heat transfer of a reentry body at very low densities for the whole region of angle of attack
[ESRO-TT-95] N75-10387

AERODYNAMIC STABILITY
Techniques for improving the stability of soft in-plane hingeless rotors
[NASA-TM-X-62390] N75-10058
The CCV concept and specifications
[NASA-TT-F-15997] N75-10060

AERODYNAMIC STALLING
Investigation of the effects of blade structural design parameters on helicopter stall boundaries
[AD-784594] N75-10075

AERODYNAMICS
Aeronautical Engineering: A special bibliography with indexes, supplement 47
[NASA-SP-7037[47]] N75-10001
Aeronautical Engineering: A special bibliography with indexes, supplement 48
[NASA-SP-7037[48]] N75-10002

AEROELASTICITY
Lifting surface theory applied to fixed wings and propellers
N75-10016

Analysis of spectral density curves in wind tunnel flutter measurements
N75-10017

AERONAUTICAL ENGINEERING
Aeronautical Engineering: A special bibliography with indexes, supplement 47
[NASA-SP-7037[47]] N75-10001
Aeronautical Engineering: A special bibliography with indexes, supplement 48
[NASA-SP-7037[48]] N75-10002
Critical analyses and laboratory research work at the stage of aircraft preliminary design
[NASA-TT-F-15996] N75-10055
Astronautics and aeronautics, 1972 --- a chronology of events
[NASA-SP-4017] N75-10129
The 1974 NASA-ASEE summer faculty fellowship aeronautics and space research program
[NASA-CR-120336] N75-10745

AEROSOLS
Flow tracing fidelity of scattering aerosol in laser Doppler velocimetry
[NASA-CR-140671] N75-10357
Quantitative determination of stratospheric aerosol characteristics
[E74-10808] N75-10535

AEROSPACE ENGINEERING
Astronautics and aeronautics, 1972 --- a chronology of events
[NASA-SP-4017] N75-10129
The 1974 NASA-ASEE summer faculty fellowship aeronautics and space research program
[NASA-CR-120336] N75-10745

AEROSPACE MEDICINE
Aerospace medicine and biology: A continuing bibliography with indexes, supplement 132
[NASA-SP-7011[132]] N75-10684
The problem of human statokinetic stability in aviation and space medicine
[NASA-TT-F-15933] N75-10687
A review of the toxicology research program of the 6570th Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio
[AD-782249] N75-10703
Measurement, evaluation, prediction and improvement of aircraft ride
[AD-783803] N75-10709

AEROSPACE SCIENCES
Soviet bloc research in geophysics, astronomy, and space, no. 334
[JPRS-63186] N75-10518
NRL progress report, January 1974
[PB-233882/0] N75-10748

AEROTHERMODYNAMICS
An inlet analysis for the NASA hypersonic research engine aerothermodynamic integration model
[NASA-TM-X-3038] N75-10348

AFRICA
Cruise data report. CHAIN 115 leg 2, Southland expedition --- to survey geophysical parameters
[AD-784421] N75-10641

AFTERBURNING
Integrated pneumatic transporter-incinerator-afterburner subsystem development --- for spacecraft waste disposal
[NASA-CR-140686] N75-10457

AGGREGATES
Measurement of platelet aggregation in flowing blood with the use of a filter --- filter-loop technique and filtragometer
N75-10699

AGING [MATERIALS]
Effect of water on the properties of a glass-polyimide laminate --- accelerated hydrolytic aging
[RM-589] N75-10186

AGRICULTURE
Geographic applications of ERTS-1 imagery to landscape change --- Mississippi River and Great Smoky Mountains of Tennessee and North Carolina
[E74-10810] N75-10537
Agriculture, forestry, range resources
N75-10558

AIR BREATHING ENGINES
Effects of air breathing engine plumes on SSV orbiter subsonic wing pressure distribution, volume 2
[NASA-CR-134417] N75-10153

AIR CARGO
An exploratory flight investigation of helicopter sling-load placements using a closed-circuit television as a pilot aid
[NASA-TN-D-7776] N75-10009

AIR CONDITIONING
Technology evaluation of heating, ventilation, and air conditioning for MIUS application
[NASA-TM-X-58128] N75-10135

AIR DUCTS
Propagation of waves in elliptic ducts. A theoretical study --- in view of jet engine compressor noise reduction
[NASA-CR-140652] N75-10378

AIR FLOW
Acoustic grazing flow impedance using waveguide principles
[NASA-CR-120848] N75-10351
Experimental determination of the pressure recovery coefficients in conical diffusors at large subsonic velocities under various inlet conditions
[NASA-TT-F-15991] N75-10354

AIR NAVIGATION
An adaptive technique for a redundant-sensor navigation system
[NASA-CR-140313] N75-10042
An azimuth determination system using the Navy navigation satellites
[AD-784375] N75-10047

AIR POLLUTION
Studies of pollutant concentration frequency distributions --- statistical techniques for air quality control
N75-10613
Three suggested methods of controlling air pollution in the US and their probable economic impact on the domestic coal industry
N75-10614
An air pollution control system
N75-10615
Air pollution translations: A bibliography with abstracts, volume 5
[PB-233374/8] N75-10619
Meteorological study for Tooele Army Depot, Volume 1
[AD-784572] N75-10666
Meteorological study for Tooele Army depot, volume 2
[AD-784573] N75-10667
Outpatient medical costs related to air pollution in the Portland, Oregon area
[EPA-600/5-74-017] N75-10692

AIR TRAFFIC
Routing of aircraft and economics of flight operations
[DLR-FB-74-25] N75-10040

AIR TRAFFIC CONTROL
Simulation studies of STOL airplane operations in metropolitan downtown and airport air traffic control environments
[NASA-TN-D-7740] N75-10038
Diode beacon techniques
[AD-783619] N75-10045
Access control and processing studies for ground satellite mobile communications/surveillance systems
[AD-784380] N75-10291
Third annual report on the financial condition and results of the operation of the Airport and Airway Trust Fund
[H-DOC-93-230] N75-10854

AIR TRANSPORTATION
Proposed international air shuttle, 1975
[GPO-31-527] N75-10034

AIR WATER INTERACTIONS
Hydraulic model study of surface and subsurface wind-driven currents in Lake Ontario
N75-10515

AIRCRAFT ACCIDENTS
Annual review of aircraft accident data: US General Aviation calendar year 1971
[NTSB-ARG-74-2] N75-10037

AIRCRAFT ANTENNAS
Aircraft-velocity measurement through radar-altimeter echo with noncoherent detection
[SLA-74-112] N75-10290
Real-time measuring procedure and measuring equipment for recording the radiation patterns of aircraft antennas in flight
[ESRO-TT-74] N75-10292

AIRCRAFT CONFIGURATIONS
Experimental determination of airplane mass and inertial characteristics
[NASA-TR-R-433] N75-10062
Aerodynamic symmetry of aircraft and guided missiles --- development of configurations to eliminate certain force and moment derivatives
[AD-784254] N75-10070

AIRCRAFT DESIGN
Critical analyses and laboratory research work at the stage of aircraft preliminary design
[NASA-TT-F-15996] N75-10055
Performance improvement through control configured vehicle concept --- active control systems for aircraft life augmentation
[NASA-TT-F-15998] N75-10059
The CCV concept and specifications
[NASA-TT-F-15997] N75-10060
Measurement, evaluation, prediction and improvement of aircraft ride
[AD-783803] N75-10709

AIRCRAFT ENGINES
An inlet analysis for the NASA hypersonic research engine aerothermodynamic integration model
[NASA-TM-X-3038] N75-10348
Low cycle high temperature fatigue --- in aircraft jet engines: conference proceedings
[AGARD-CP-155] N75-10487
Problems of low cycle high temperature fatigue in aircraft jet engines
N75-10488
Precision in LCHTF testing --- of aircraft jet engines
N75-10490
The effect of cycle parameters on high temperature low cycle fatigue --- in aircraft jet engines
N75-10491
Lifetime prediction methods for elevated temperature fatigue --- in aircraft jet engines
N75-10493
Design procedures for elevated temperature low-cycle fatigue --- as applied to aircraft jet engines
N75-10494

AIRCRAFT EQUIPMENT
A conceptaul definition study for a digital avionics information system [approach 2], volume 1
[AD-780581/5] N75-10071
A conceptual definition study for a digital avionics information system [approach 2]. Volume 2: Appendixes A thru D
[AD-780582/3] N75-10072
Development of accelerated life testing techniques for general failure modes of aircraft hardware
[AD-784188] N75-10073
Determination of the forces in the retractor of a three-dimensional landing gear mechanism
[AD-784257] N75-10078
Technology development report: Results of static electricity discharge system tests [active and passive] heavy lift helicopter
[AD-784130] N75-10082
T and E guidelines for aircraft systems
[AD-784549] N75-10085
T and E guidelines for airborne ECM systems
[AD-784574] N75-10332
The impact of opto-electronics upon avionics --- development and application of electro-optical equipment with emphasis on system design
N75-10775

AIRCRAFT GUIDANCE
Automatic flying of curved approach paths: A computer and flight investigation
[RAE-TR-73154] N75-10043

AIRCRAFT LANDING
Estimation of the characteristics of various flare profiles
[ESRO-TT-89] N75-10031

AIRCRAFT MAINTENANCE
Operational effectiveness of transport aircraft
[NASA-TT-F-810] N75-10036
Interservice utility helicopter reliability and maintainability comparative analysis
[AD-784177] N75-10080

AIRCRAFT MODELS
A technique for displaying flight information in the field of view of binoculars for use by the pilots of radio controlled models
[NASA-TM-X-72015] N75-10786

AIRCRAFT NOISE
Reliability of laboratory tests of VSTOL and other long duration noises
[NASA-CR-2471] N75-10093
A survey of aircraft noise annoyance in an area of invariant noise to eliminate the effects on annoyance of varying noise exposure
[TT-7405] N75-10755

AIRCRAFT PERFORMANCE
Critical review of methods to predict the buffet capability of aircraft
[AGARD-R-623] N75-10053
Transonic buffet behavior of Northrop F-5A aircraft
[NASA-CR-140939] N75-10054
T and E guidelines for aircraft systems
[AD-784549] N75-10085

AIRCRAFT SAFETY
The attainable goal in airline safety
N75-10035

AIRCRAFT STABILITY
Transonic buffet behavior of Northrop F-5A aircraft
[NASA-CR-140939] N75-10054
A study of stabilization techniques for small, fixed-wing, remotely piloted aircraft
[AD-784109] N75-10079
Yaw axis stability augmentation system flight test report --- flight tests of H-58 helicopter
[AD-784134] N75-10083

AIRCRAFT STRUCTURES
Aerospace Research
[ESRO-TT-40] N75-10367
Determination of the dynamic characteristics of a structure from a vibration test performed with only one excitation point --- exemplified for aircraft structures
N75-10371

AIRCRAFT SURVIVABILITY
Two dimensional analysis of fluid-structure interaction by method of finite differences: hydraulic ram, the fuel tank problem
[AD-783839] N75-10068

AIRFOIL PROFILES
Aerospace Research --- topics on airfoil profiles, flow visualization, ablative materials, microanalysis, and filter analysis
[ESRO-TT-90] N75-10011
On the flow around the leading edge of an aerofoil
N75-10012

Methods of visualizing the leading edge separation bubble and analysis of the results
N75-10013
Time-dependent methods for computing wall effects in two-dimensional supercritical flow --- over an airfoil
N75-10369

AIRFOILS
The nature, development and effect of the viscous flow around an aerofoil with high-lift devices
[ARC-CP-1258] N75-10021
A two-dimensional aerofoil oscillating at low frequencies in high subsonic flow
[ARC-CP-1285] N75-10027
Further work on the integration of closed loops specified only as discrete data points --- using FORTRAN
[RAE-TR-73177] N75-10723

AIRLINE OPERATIONS
The attainable goal in airline safety
N75-10035
Routing of aircraft and economics of flight operations
[DLR-FB-74-25] N75-10040

AIRPORT PLANNING
Lake Erie international jetport model feasibility investigation. Report 1: Scope of study and review of available data
[AD-783463] N75-10114

AIRPORTS
Simulation studies of STOL airplane operations in metropolitan downtown and airport air traffic control environments
[NASA-TN-D-7740] N75-10038
A microwave model of the instrument landing system
[PB-232747/6] N75-10113
The social cost of airport noise as measured by rental changes: The case of Logan Airport
N75-10849
Third annual report on the financial condition and results of the operation of the Airport and Airway Trust Fund
[H-DOC-93-230] N75-10854
Implementation of the Noise Control Act of 1972 [aircraft-airport noise], part 2
[GPO-33-871] N75-10864

AIRSHIPS
Some factors affecting the use of lighter than air systems --- economic and performance estimates for dirigibles and semi-buoyant hybrid vehicles
[NASA-TM-X-62374] N75-10004

AIRSPACE
Third annual report on the financial condition and results of the operation of the Airport and Airway Trust Fund
[H-DOC-93-230] N75-10854

AIRSPEED
Aircraft-velocity measurement through radar-altimeter echo with noncoherent detection
[SLA-74-112] N75-10290

ALABAMA
A review of initial investigations to utilize ERTS-1 data in determining the availability and distribution of living marine resources --- harvest and management of fisheries resources in Mississippi Sound and Gulf waters
N75-10555

ALASKA
Evaluate ERTS imagery for mapping and detection of changes of snowcover on land and on glaciers --- Alaska and Washington
[E74-10812] N75-10539
Environmental surveys in Alaska based upon ERTS data
N75-10551

ALGORITHMS
Two FORTRAN contouring routines
[NPL-NAC-47] N75-10724
Unified approach to quadratically convergent algorithms for constrained function minimization
N75-10729
Symbolic integration of a class of algebraic functions --- by an algorithmic approach
[NASA-CR-140707] N75-10730

ALKALI METALS
Research investigation directed toward extending the useful range of the electromagnetic spectrum --- atomic spectra and electronic structure of alkali metals
[NASA-CR-140678] N75-10272

ALLOCATIONS
Public works for water and power development and Atomic Energy Commission Appropriation Bill, 1975. Part 6: Tennessee Valley Authority
[GPO-32-403] N75-10859

ALLOYS
Research on varied properties of metals, ceramics, polymers, and alloys
[AD-783964] N75-10185
Structure and properties of alloys for atomic energy
N75-10204

ALTERNATING CURRENT
On the operating characteristics of induction motors fed by thyristor inverters
[SERIAL-150-VOL-24-NO-1] N75-10310

ALTIMETERS
Station coordinates for GEOS-C altimeter calibration and experimentation
[NASA-TM-X-70762] N75-10413

ALUMINUM
Effect of electron irradiation on mechanical properties and structure of aluminum
[AD-784321] N75-10242
Ultrasonic welding of electrical terminations
[BDX-613-1016] N75-10460

ALUMINUM ALLOYS
Particle size distribution effects in precipitation hardening
[UCLA-34-P-172-11] N75-10232
Research on synthesis of high-strength aluminum alloys. Part 2: Control of grain structure during hot working
[AD-783353] N75-10239
Structure dependence of high temperature deformation of metals
[SU-326-P-17-X-5] N75-10498
Fatigue endurance, crack sensitivity and nucleation characteristics of structural elements in four aluminium-copper alloys
[ARC-CP-1259] N75-10503
An experimental investigation of unsymmetric crack tip deformation fields in materials with nonuniform properties
[AD-784136] N75-10504
The collection, generation, and analysis of MIL-HDBK-5 allowable design data --- fatigue data for aluminum alloys, titanium alloys, and steels
[AD-783616] N75-10506
The effects of welding and various postweld treatments on the low-cycle fatigue behavior of 5086-H116 and 5456-H117 aluminum alloys
[AD-784392] N75-10509
Thermodynamics of the Al-Si system
[PB-234070/1] N75-10846

ALUMINUM OXIDES
Diffusion studies in nonmetallic system, part 1 --- formation of nickel alumina oxides
[AD-784437] N75-10246

AMORPHOUS MATERIALS
Network models of crystals
[AD-784516] N75-10835

AMORPHOUS SEMICONDUCTORS
Novel materials for power systems. Part 2: Investigations of proton semi-conducting glasses
[AD-784448] N75-10257

AMPLIFIERS
Soft apertures for reducing damage in high power laser amplifier systems
[LA-5496-MS] N75-10439

ANALOG SIMULATION
Analog simulation of the small perturbation equation applied to transonic flows --- and wall and cascade flows
N75-10370

ANEMOMETERS
A method for identifying large particles in laser anemometry --- mie scattering
[ISL-37/73] N75-10441

ANGULAR RESOLUTION
High angular resolution and position determinations by infrared interferometry
[NASA-CR-140670] N75-10877

ANNEALING
In-situ transport measurements on UHV grown a-Ge samples
[SLA-73-7074] N75-10834

ANNIHILATION REACTIONS
Orthopositronium annihilation in liquid and solid helium
N75-10762

ANTARCTIC REGIONS
Overall evaluation of ERTS-1 imagery for cartographic application --- Australia, Antarctica, U.S., and U.S.S.R.
[E74-10800] N75-10528

ANTENNA ARRAYS
Arrays of UHF log-periodic aerials: A vertically-polarised receiving aerial for re-broadcast links
[BBC-RD-1974/30] N75-10274
A prototype four-horn cluster IFF antenna
[AD-784395] N75-10327
Synthesis of antenna arrays
[AD-784410] N75-10330
Stripline flush mount antenna array
[AD-783334] N75-10335
Optical transfer function of NTS-1 retroreflector array
[NASA-CR-140667] N75-10773

ANTENNA DESIGN
Arrays of UHF log-periodic aerials: A vertically-polarised receiving aerial for re-broadcast links
[BBC-RD-1974/30] N75-10274

ANTENNA RADIATION PATTERNS
Real-time measuring procedure and measuring equipment for recording the radiation patterns of aircraft antennas in flight
[ESRO-TT-74] N75-10292

ANTENNAS
Methods of coherent optics and holography applied to problems in antenna engineering and data processing
[AD-784337] N75-10433

ANTIFRICTION BEARINGS
Endurance testing of an LM-726-4 elastomeric pitch change bearing
[AD-784140] N75-10074
Low temperature testing of an AH-1G helicopter equipped with elastomeric flapping and feathering bearings in the main rotor
[AD-784189] N75-10081

ANTIKNOCK ADDITIVES
Limit lead in gasoline
[GPO-29-660] N75-10259
Impact of motor gasoline lead additive regulations on petroleum refineries and energy resources, 1974-1980, phase 1
[PB-234185/7] N75-10601

APOLLO TELESCOPE MOUNT
Investigation of tantalum wet slug capacitor failures in the Apollo telescope mount charger battery regulator modules
[NASA-CR-120497] N75-10468
Test program on the contamination of ultraviolet region mirrors by Apollo Telescope Mount materials
[NASA-CR-120516] N75-10772

APOLLO 17 FLIGHT
Apollo 17 ultraviolet spectrometer experiment [S-169]
[NASA-CR-140316] N75-10128

APPROACH CONTROL
Estimation of the characteristics of various flare profiles
[ESRO-TT-89] N75-10031

AQUEOUS SOLUTIONS
The influence of surfactants on the adhesion between solids --- measurement of force of adhesion between crossed carbon filaments submerged in an aqueous buffer solution
N75-10254

ARCHES
Static and dynamic buckling of shallow arches
N75-10482

ARGON PLASMA
Conical electrostatic probe response in a weakly ionized gas flow --- for measuring ion density
[AD-783261] N75-10815

ARID LANDS
A study to explore the use of orbital remote sensing to determine native arid plant distribution --- Arizona Regional Ecological Test Site
[E74-10818] N75-10544

ARIZONA REGIONAL ECOLOGICAL TEST SITE
A study to explore the use of orbital remote sensing to determine native arid plant distribution --- Arizona Regional Ecological Test Site
[E74-10818] N75-10544

ARMED FORCES [UNITED STATES]
Meteorological study for Tooele Army Depot, Volume I
[AD-784572] N75-10666

ARTIFICIAL SATELLITES
On power conditioning for satellite stabilisation thrusters
[RAE-LIB-TRANS-1771] N75-10158

ASTROMETRY
Astrometry and astrophysics
[NASA-TT-F-15767] N75-10884

ASTRONAUTS
Skeletal status and soft tissue composition in astronauts. Tissue and fluid changes by radionuclide absorptiometry in vivo
[NASA-CR-140703] N75-10696

ASTRONOMICAL MODELS
Models of massive molecular clouds
[AD-780922/1] N75-10885

ASTRONOMICAL PHOTOMETRY
Certain systematic errors arising in the photometry of planetary discs
[NASA-TT-F-15999] N75-10405

ASTRONOMY
Soviet bloc research in geophysics, astronomy, and space, no. 334
[JPRS-63186] N75-10518

ASTROPHYSICS
Astrometry and astrophysics
[NASA-TT-F-15767] N75-10884

ASYMMETRY
Asymmetric grain evaluation computer program --- for solid rocket propellant
[AD-784350] N75-10264

ATLANTIC OCEAN
Geologic and geomagnetic background noise in two areas of the North Atlantic, phase 1 --- magnetic interference arising from sea floor geology
[AD-783693] N75-10627
Cruise data report. CHAIN 115 leg 2, Southlant expedition --- to survey geophysical parameters
[AD-784421] N75-10641

ATLAS CENTAUR LAUNCH VEHICLE
INTELSAT 4 --- to be positioned over equator of Pacific Ocean
[NASA-NEWS-RELEASE-74-305] N75-10131

ATMOSPHERIC ATTENUATION
N2 scattering measurements at 10.6 microns
[AD-784723] N75-10200
Passive infrared systems --- effects of atmosphere on imaging techniques and sensor design
N75-10784

ATMOSPHERIC CIRCULATION
Transport processes and trace constituents in the stratosphere --- effects of supersonic aircraft operation on ozone distribution
[COO-2249-3] N75-10523
Comparison of the Southern and Northern Hemisphere general circulation characteristics as determined by satellite ozone data
[UCRL-75556] N75-10638
Atmospheric measurements program
[AD-784374] N75-10653
Integration of equations of the dynamics of the atmosphere for solving problems in climate theory
[AD-783971] N75-10662

ATMOSPHERIC COMPOSITION
ESRO Nimra conversion study --- conversion of IR radiometers to spacelab compatible experiments to measure atmospheric gas distribution
[HSD-TP-7472] N75-10133
Atmospheric properties and their effect on target acquisition under flare illumination
[AD-783052] N75-10665
Theoretical investigation of stellar atmospheres with specific application to the atmosphere of a carbon star R coronae borealis
N75-10871

ATMOSPHERIC DENSITY
Propagation effects at radio frequencies on satellite navigation systems --- atmospheric effects on radio transmission
[AD-784378] N75-10747

ATMOSPHERIC ELECTRICITY
Interference with aircraft radio navigation and communications by precipitation static from ice and snow clouds: Electrostatic wind tunnel experiments
[AD-784623] N75-10046
Studies in atmospheric electricity
[TT-74-50008] N75-10623

ATMOSPHERIC ENTRY
Static stability characteristics of the space shuttle external tank [MSFC model 458] during reentry in the MSFC 14-inch TWT [TA1F]
[NASA-CR-134420] N75-10151
Thermal-structural evaluation of TD Ni-20Cr thermal protection system panels
[NASA-CR-132487] N75-10155
Self-sterilization of bodies during outer planet entry
[NASA-CR-140808] N75-10678

ATMOSPHERIC MODELS
An air pollution control system
N75-10615
Modelling for the first GARP global experiment
[GARP-PUBL-14] N75-10639
User's guide to auxiliary programs for the Mintz-Arakawa atmospheric model
[AD-784443] N75-10660
Atmospheric response to variations in sea surface temperature
[NASA-CR-140604] N75-10672

ATMOSPHERIC PHYSICS
Atmospheric and climatological research progress
N75-10632

ATMOSPHERIC PRESSURE
Report of the meeting on drifting buoys for the first GARP global experiment
[GARP-SPEC-REPT-13] N75-10674

ATMOSPHERIC REFRACTION
Light refraction by mean temperature gradients in the near-earth atmosphere
[AD-783484] N75-10790

ATMOSPHERIC TEMPERATURE
On calculating radioactive fluxes and temperature changes in atmospheres off arbitrary structure
[AD-784442] N75-10659
Infrared water vapor and temperature profiler
[AD-783984] N75-10661

ATMOSPHERIC TURBULENCE
Turbulence studies on a high-altitude sounding aircraft --- studies of convective processes turbulence, and wave propagation in the atmosphere
[NASA-TT-F-16003] N75-10622

ATMOSPHERICS
Proceedings of the Waldorf Conference on Long Range Geographic Estimation of Lightning Sources
[AD-784393] N75-10624

ATOMIC ENERGY LEVELS
Helium at zero temperature with hard-sphere and other forces
[COO-3077-35] N75-10182

ATOMIC STRUCTURE
Structure and properties of alloys for atomic energy
N75-10204
Atomic crack simulation in fracture mechanics
[AD-783724] N75-10243

ATS 6
Mission operation report: Applications Technology Satellite [ATS-F]
[NASA-TM-X-72530] N75-10141

ATTITUDE [INCLINATION]
Translatory shock absorbers for attitude sensors
[NASA-CASE-MFS-22905-1] N75-10407

ATTITUDE CONTROL
Precision Pointing Control System [PPCS] system design and analysis --- for gimbaled experiment platforms
[NASA-CR-139132] N75-10157
Mariner Mars 1971 attitude control subsystem
[NASA-CR-140706] N75-10168
Viking Orbiter 1975 thrust vector control system accuracy
[NASA-CR-140705] N75-10169
Results of reaction control system on-orbit jet simulation using an 0.0175-scale configuration 3 space shuttle orbiter model [21-0] in the LaRC 60-foot vacuum sphere
[NASA-CR-134415] N75-10170

ATTITUDE STABILITY
Viking Orbiter 1975 thrust vector control system accuracy
[NASA-CR-140705] N75-10169

AUSFORMING
The effect of ausworking on the strength of type 420 stainless steel with the addition of carbide-forming elements
N75-10206

AUSTENITE
The effect of the titanium content on the active corrosion of ferritic r-steels and austenitic Cr-Ni-steels in sulfuric acid
[NASA-TT-F-15994] N75-10211

AUSTENITIC STAINLESS STEELS
Effect of composition on stress corrosion cracking of austeniiic stainless steels in several concentrations of boiling MgCl2 solutions
[NASA-TT-F-15995] N75-10207
Apparatus for measuring the ferrite content of austenitic stainless steel weld material
[NASA-CASE-MFS-22907-1] N75-10210

AUSTRALIA
Overall evaluation of ERTS-1 imagery for cartographic application --- Australia, Antarctica, U.S., and U.S.S.R.
[E74-10800] N75-10528
The PUCE programme for terrain evaluation for engineering purposes. 2: Procedures for terrain classification
[PB-233847/3] N75-10625
Rocket operations plan. Australian eclipse June 1974
[SLA-74-117] N75-10895

AUTOCORRELATION
Autocorrelation and spectral methods of measuring speed of motion
[AD-783973] N75-10422

AUTOMATIC CONTROL
Cabtrack: Communications and control instrumentation for a one-fifth scale test track
[RAE-TR-73169] N75-10867

AUTOMATIC LANDING CONTROL
Automatic flying of curved approach paths: A computer and flight investigation
[RAE-TR-73154] N75-10043

AUTOMOBILE ENGINES
New motor vehicle emission standards and fuel economy
[GPO-29-272] N75-10863

AVALANCHE DIODES
Diode beacon techniques
[AD-783619] N75-10045
Optical waveguide data transmission for avionics --- analysis of materials, structures, circuits, and waveguide/terminal interface
N75-10779

AVIONICS
A conceptaul definition study for a digital avionics information system [approach 2], volume 1
[AD-780581/5] N75-10071
A conceptual definition study for a digital avionics information system [approach 2]. Volume 2: Appendixes A thru D
[AD-780582/3] N75-10072
Opto-electronics --- application of electro-optical equipment for avionic systems
[AGARD-LS-71] N75-10774
The impact of opto-electronics upon avionics --- development and application of electro-optical equipment with emphasis on system design
N75-10775

AXIAL COMPRESSION LOADS
Minimum-weight designs for hat-stiffened composite panels under uniaxial compression
[NASA-TN-D-7779] N75-10497

AXIAL FLOW
A rational basis for circumferential distortion index formulation
[AD-783819] N75-10394

AXIAL LOADS
Holographic study of rock specimens under uniaxial and triaxial loads
[AD-784433] N75-10431
Multiaxial fatigue. Present and future methods of correlation
N75-10492

AXISYMMETRIC FLOW
Generation of velocity profiles using screens of nonuniform solidity
N75-10362

B

BACKSCATTERING
A study of a dual polarization laser backscatter system for remote identification and measurement of water pollution
[NASA-CR-140665] N75-10563
High frequency electromagnetic wave backscattering from radially inhomogeneous dielectric spheres
N75-10742

BACTERIA
Probability of illness definition for the Skylab flight crew health stabilization program
[NASA-CR-140300] N75-10691
Consideration of probability of bacterial growth for Jovian planets and their satellites
[NASA-CR-140807] N75-10712

BALANCING
Dynamic and static balancing gyroscopic equipment
N75-10401

BALL BEARINGS
HLH/ATC engine shaft support bearing development program
[AD-784593] N75-10097

BALLISTIC RANGES
The unit Reynolds number effect on boundary layer transition
N75-10340

BALLISTIC TRAJECTORIES
A detection system with two photomultiplier units for measurement of projectile terminal velocity
[PHL-74-22] N75-10421

BALLOON-BORNE INSTRUMENTS
The composition of cosmic rays with Z greater than or equal to 12 --- detected during high altitude balloon flight
N75-10897

BARS
Overall study on mechanics of leveling and straightening
[SERIAL-149-VOL-23-NO-6] N75-10483

BATTERY CHARGERS
Investigation of tantalum wet slug capacitor failures in the Apollo telescope mount charger battery regulator modules
[NASA-CR-120497] N75-10468

BEACONS
Optimal light characteristics for battery operated navigation lights --- surface navigation beacons
[IZF-1974-8] N75-10044

BED REST
In vivo measurement of human body composition
[NASA-CR-140668] N75-10690

BENDING
Reduction of errors in ceramic bend tests --- stress concentration and displacement
[AD-784435] N75-10256

BERYLLIUM
Study of an interface structure design, phase 1 --- conical type structure and flat platform in beryllium
[ESS/SS-526] N75-10160

BIBLIOGRAPHIES
Aeronautical Engineering: A special bibliography with indexes, supplement 47
[NASA-SP-7037[47]] N75-10001
Aeronautical Engineering: A special bibliography with indexes, supplement 48
[NASA-SP-7037[48]] N75-10002
Coal processing: Gasification, liquefaction, desulfurization: A bibliography, 1930 - 1974
[TID-3349] N75-10578
NSF-Rann energy abstracts: A monthly abstract journal of energy research
[ORNL-EIS-74-52-VOL-2-NO-1] N75-10592
Air pollution translations: A bibliography with abstracts, volume 5
[PB-233374/8] N75-10619
Bibliography of Soviet material on internal waves, January - March 1974
[AD-782018] N75-10675
Aerospace medicine and biology: A continuing bibliography with indexes, supplement 132
[NASA-SP-7011[132]] N75-10684

BILLETS
Electroslag smelting of large-size hollow billets
N75-10219
Using EShP to obtain cast electroslag forging billets
N75-10223

BINARY CODES
The J-code: A minimum peak distortion code
[AD-783949] N75-10296

BINARY STARS
Infrared, radio, and X-ray observations of Cygnus X-3
[NASA-CR-140680] N75-10882

BINOCULARS
A technique for displaying flight information in the field of view of binoculars for use by the pilots of radio controlled models
[NASA-TM-X-72015] N75-10786

BIOGEOCHEMISTRY
Transformation of organic substances in soil
[NASA-TT-F-15985] N75-10521
Geochemical activity of soil microorganisms as an integral part of biogeocenosis
[NASA-TT-F-15976] N75-10565

BIOLOGICAL EFFECTS
Aerospace medicine and biology: A continuing bibliography with indexes, supplement 132
[NASA-SP-7011(132)] N75-10684

BIOMEDICAL DATA
Research in solid state, plasmas, electrical and biomedical engineering
[AD-784655] N75-10750

BIOMETRICS
Skeletal status and soft tissue composition in astronauts. Tissue and fluid changes by radionuclide absorptiometry in vivo
[NASA-CR-140703] N75-10696

BIRDS
Utilization of Skylab (EREP) system for appraising changes in continental migratory bird habitat
[E74-10817] N75-10543
Utility of ERTS for monitoring the breeding habit of migratory waterfowl --- United States and Canada
N75-10557

BISTATIC REFLECTIVITY
Bistatic radar sea state monitoring
[NASA-CR-137469] N75-10673

BLOOD FLOW
Measurement of platelet aggregation in flowing blood with the use of a filter --- filter-loop technique and filtragometer
N75-10699

BODY COMPOSITION (BIOLOGY)
In vivo measurement of human body composition
[NASA-CR-140668] N75-10690

BODY WEIGHT
Food unit, based on reserves of dehydrated products, in life support systems for crews of spaceships during prolonged flights --- space flight feeding and spacecrew body weights
[AD-784289] N75-10710

BOLTZMANN TRANSPORT EQUATION
On changes of variables in kinetic theory
[TRITA-EPP-74-11] N75-10806
The two dimensional transient solution of the carrier transport equations in solid-state devices
N75-10819

BONDING
Quantitative analysis of the influence of contaminants on thermocompression bonding of gold
[SLA-73-1099] N75-10228
Evaluation of pre-bond etchants in hybrid microcircuit processing
[SLA-73-1049] N75-10316
Techaique for testing the tensile strength of thermocompression bonds
[SLA-74-93] N75-10470

BONES
Applications of the direct photon absorption technique for measuring bone mineral content in vivo. Determination of body composition in vivo
[NASA-CR-140708] N75-10694
Skeletal status and soft tissue composition in astronauts. Tissue and fluid changes by radionuclide absorptiometry in vivo
[NASA-CR-140689] N75-10695
Skeletal status and soft tissue composition in astronauts. Tissue and fluid changes by radionuclide absorptiometry in vivo
[NASA-CR-140703] N75-10696

BORON
Response of boron-epoxy composite to impact loading
[AD-784600] N75-10191

BOUNDARY LAYER CONTROL
Ground effect for V/STOL aircraft configurations and its simulation in the wind tunnel. Part 3: The tangentially blown ground as an alternative to a moving ground: Application to the NASA-Ames 40 by 80-foot wind tunnel
[NASA-CR-114497] N75-10005

BOUNDARY LAYER FLOW
The stability of parallel flows between plane boundaries of two superposed viscoelastic fluids
N75-10337
A simple method of calculating power-law velocity profile exponents from experimental data --- for boundary layer shape factor
[NASA-TM-X-72000] N75-10356
Measurements in a turbulent horseshoe vortex and the problem of probe interference
[IC-AERO-73-08] N75-10375

BOUNDARY LAYER SEPARATION
Performance and exit distortion of diffusers as determined by force measurements --- using laminar inlet boundary layers
N75-10361

BOUNDARY LAYER STABILITY
EUROMECH 46: Numerical and experimental investigations of the stability of boundary layers
[AD-783568] N75-10391

BOUNDARY LAYER TRANSITION
The unit Reynolds number effect on boundary layer transition
N75-10340

BOUNDARY LAYERS
Remote sensing of ocean current boundary layer --- Florida
[E74-10801] N75-10529
An experiment to measure the modulation transfer function of the atmosphere in the marine boundary layer
[AD-783807] N75-10792

BOUNDARY VALUE PROBLEMS
Extremal boundary value problems in the theory of plasticity
[AD-784172] N75-10513

BRANCHING (MATHEMATICS)
On the non-existence of adjacent equilibrium states at bifurcation points
[AD-783336] N75-10510

BRAZING
Convection effects on Skylab experiments M551, M552, and M553, phase C report --- metal melting, exothermic brazing, and sphere forming under weightless conditions
[NASA-CR-120482] N75-10120

BREADBOARD MODELS
Traveling wave tube lineariser --- for communication satellites
[ESRO-CR(P)-489] N75-10323

BRIGHTNESS
Application of satellite cloud brightness data for large scale tropical analysis: A correlation study of brightness and 200-MB divergence
[AD-784366] N75-10652

BRINES
Geochemistry of liquids, gases, and rocks from the Smackover formation
[PB-233427/4] N75-10525

BROADCASTING
Laser beam deflection --- using acousto-optical grating
[BBC-RD-1974/31] N75-10434

BUBBLES
Methods of visualizing the leading edge separation bubble and analysis of the results
N75-10013

BUCKLING
Static and dynamic buckling of shallow arches
N75-10482

BUFFETING
Critical review of methods to predict the buffet capability of aircraft
[AGARD-R-623] N75-10053
Transonic buffet behavior of Northrop F-5A aircraft
[NASA-CR-140939] N75-10054

BUILDINGS
Testing of a flat conductor cable baseboard system for residential and commercial wiring
[NASA-TM-X-64888] N75-10313
Optimal material systems for frame buildings subjected to solar heating --- computerized selection of laminate materials
N75-10480

BUOYANCY
Bouyancy effects on a turbulent shear flow
[AD-784438] N75-10398

BUOYS
Report of the meeting on drifting buoys for the first GARP global experiment
[GARP-SPEC-REPT-13] N75-10674

C

CADMIUM
The mobility of coincidence and near coincidence grain boundaries
[AD-782908] N75-10236

CADMIUM SULFIDES
Some aspects of optical feedback with cadmium sulfide and related photoconductors --- for extended frequency response
[NASA-TN-D-7727] N75-10785

CALCIUM OXIDES
Production of edible carbohydrates from formaldehyde in a spacecraft. pH variations in the calcium hydroxide catalyzed formose reaction
[NASA-CR-140684] N75-10181

CALORIMETERS
Development of insulation transfer-standards using a flat plate calorimeter
[NASA-CR-140710] N75-10403

CAMERA SHUTTERS
Large aperture electrooptic photographic shutter
[SLA-74-101] N75-10416

CAMERAS
Geodetic results from ISAGEX data --- for obtaining center of mass coordinates for geodetic camera sites
[NASA-TM-X-70763] N75-10567

CANADA
The Canadian ERTS program
N75-10550
Utility of ERTS for monitoring the breeding habit of migratory waterfowl --- United States and Canada
N75-10557

CANONICAL FORMS
Canonical formulation of instantaneous electrodynamics, gravitation
N75-10620

CAPACITORS
Problems in producing highest energy densities by organic capacitor dielectrics
[BMFT-FB-T-74-10] N75-10321
Investigation of tantalum wet slug capacitor failures in the Apollo telescope mount charger battery regulator modules
[NASA-CR-120497] N75-10468
Present-day status of accelerated testing of fixed capacitors
[ESRO-CR-168] N75-10473

CAPE KENNEDY LAUNCH COMPLEX
Station set requirements document. Volume 82: Fire support. Book 2: Preliminary functional fire plan
[NASA-TM-X-72032] N75-10105

CARBIDES
Directionally solidified Co-Cr-C composites. Microstructure and strength between 20 C and 1050 C obtained by different solidification modes
[RAE-LIB-TRANS-1764] N75-10187
The effect of ausworking on the strength of type 420 stainless steel with the addition of carbide-forming elements
N75-10206

CARBON
Multicharged particle emission in the disintegration of carbon induced by high-energy electrons --- polystyrene foil, plastic detectors
[NOTA-INTERNA-555] N75-10767

CARBON DIOXIDE
Shock-tube studies of vibrational equilibration in carbon dioxide by simultaneous laser absorption and infrared-emission measurements
N75-10346

CARBON DIOXIDE LASERS
Shock-tube studies of vibrational equilibration in carbon dioxide by simultaneous laser absorption and infrared-emission measurements
N75-10346
A study of CO2 gasdynamic lasers. Part 1: Theoretical and numerical analysis --- molecular exchange mechanisms
[CP-38] N75-10435
Removal of insulation from multiconductor wire tape using a carbon dioxide laser
[BDX-613-887-REV] N75-10437
CO2 MHD laser: Analysis, design and shock tunnel experiments
[AD-782226] N75-10443

CARBON FIBERS
Heat transfer in high temperature opacified fiber insulation
[SLA-73-5677] N75-10189
Carbon-fiber-reinforced polymers and their thermal decomposition to carbon-carbon composites
[NASA-TT-F-15990] N75-10252
The influence of surfactants on the adhesion between solids --- measurement of force of adhesion between crossed carbon filaments submerged in an aqueous buffer solution
N75-10254

CARBON MONOXIDE
Novel materials for power systems. Part 1: Schizophrenic catalysts --- oxidation of carbon monoxide and reduction of nitrogen oxides over chromium catalysts
[AD-784447] N75-10203
Carbon monoxide monitor --- using real time
[NASA-CASE-MFS-22060-1] N75-10414
Calculation of NO and CO molecular spectra in the coma of a comet --- related to Kohoutek UV spectrum measurements
[MPI-PAE/EXTRATERR-98] N75-10880
Models of massive molecular clouds
[AD-780922/1] N75-10885

CARBON-CARBON COMPOSITES
Carbon-fiber-reinforced polymers and their thermal decomposition to carbon-carbon composites
[NASA-TT-F-15990] N75-10252

CARGO
An analysis of some world transport statistics
[PB-232940/7] N75-10868

CARRIER MOBILITY
The two dimensional transient solution of the carrier transport equations in solid-state devices
N75-10819

CARRIER WAVES
Dispersion and instability characteristics of solid-state carrier waves in microwave integrated systems --

- based on Maxwell, continuity, and Boltzmann transport equations N75-10827

CASCADE FLOW
Calculation of the plane supersonic flow through cascades using the method of analytical characteristics [ESRO-TT-78] N75-10383

CASCADE RANGE [CA-OR-WA]
Evaluate ERTS imagery for mapping and detection of changes of snowcover on land and on glaciers --- Alaska and Washington [E74-10812] N75-10539

CASCADES
Satellite X4: The 100-element self-scanned photodiode array experiment [RAE-TR-73195] N75-10145
High speed cascade noise [TT-7406] N75-10756

CASTING
Room temperature tensile properties of titanium and seven titanium alloys prepared by skull casting [BM-RI-7949] N75-10208

CATALYSTS
Production of edible carbohydrates from formaldehyde in a spacecraft. pH variations in the calcium hydroxide catalyzed formose reaction [NASA-CR-140684] N75-10181
Novel materials for power systems. Part 1: Schizophrenic catalysts --- oxidation of carbon monoxide and reduction of nitrogen oxides over chromium catalysts [AD-784447] N75-10203
Surface electronic properties and the search for new hydrogen oxidation catalysts --- considering tungsten, platinum, and tungsten carbide [SLA-73-5805] N75-10833

CELESTIAL BODIES
Dynamics of the solar wind and its interaction with bodies in the solar system [NASA-CR-140702] N75-10894

CENTAUR LAUNCH VEHICLE
Centaur feedline dynamics study using power spectral methods --- fundamental mode resonant frequencies of RL-10 oxygen and hydrogen feed lines [NASA-TM-X-3111] N75-10171

CENTER OF GRAVITY
Experimental determination of airplane mass and inertial characteristics [NASA-TR-R-433] N75-10062
Geodetic results from ISAGEX data --- for obtaining center of mass coordinates for geodetic camera sites [NASA-TM-X-70763] N75-10567

CENTRIFUGAL COMPRESSORS
Shrouded impeller test program [AD-784133] N75-10100

CERAMICS
Strengthening of oxidation resistant materials for gas turbine applications --- treatment of silicon ceramics for increased flexural strength and impact resistance [NASA-CR-134661] N75-10092
Research on varied properties of metals, ceramics, polymers, and alloys [AD-783964] N75-10185
Mechanical behavior of polycrystalline ceramics: Brittle fracture of SiC-Si3N4 materials [NASA-CR-134732] N75-10251
Reduction of errors in ceramic bend tests --- stress concentration and displacement [AD-784435] N75-10256
Piezoelectric traveling wave amplifiers --- based on surface shear waves [BMFT-FB-T-74-05] N75-10318

CH-47 HELICOPTER
Model 301 HLH/ATC [Heavy Lift Helicopter/Advanced Technology Component] transmission noise reduction program [AD-784132] N75-10063
Technology development report: Results of static electricity discharge system tests [active and passive] heavy lift helicopter [AD-784130] N75-10082

CHANNEL FLOW
One-dimensional equations for MHD channel flows N75-10365

CHAPMAN-ENSKOG THEORY
On changes of variables in kinetic theory [TRITA-EPP-74-11] N75-10806

CHARACTER RECOGNITION
Coherent optical filtering methods in the object and space frequency domain [experiments, theory and critical considerations for application in the fields of character reading and pattern recognition] [BMFT-FB-T-74-08] N75-10728

CHARGE COUPLED DEVICES
Study of the use of Charge-Coupled Devices [CCDs] in analog signal processing systems [AD-783703] N75-10300

CHARGED PARTICLES
Multicharged particle emission in the disintegration of carbon induced by high-energy electrons --- polystyrene foil, plastic detectors [NOTA-INTERNA-555] N75-10767
Charged particle beam-plasma interactions for thermonuclear power generation [AD-782060] N75-10812

CHECKOUT
T and E guidelines for command and control systems [AD-784550] N75-10301

CHEMICAL ELEMENTS
Water elution of organic matter in the northern Taiga forests of the Kola Peninsula [NASA-TT-F-15981] N75-10519

CHEMICAL ENERGY
Chemical to electromagnetic energy conversion techniques --- explosive flux compression technology [AD-783901] N75-10609

CHEMICAL LASERS
Analytical and experimental research on HF chemical lasers [AD-784590] N75-10444
H2-Cl2 chemical laser program. Part 3: Additional arc jet laser experiments [AD-782871] N75-10446
Analytical investigation of the effects of rotational relaxation in a C. W., HF chemical laser [AD-784589] N75-10448
Analysis of chemical lasers. Volume 1: Laser and mixing program lamp theory and user's guide [AD-784531] N75-10449
Analysis of chemical lasers. Volume 2: Chemical laser flow analyses [AD-784532] N75-10450
Analysis of chemical lasers. Volume 3: One dimensional laser and mixing program guide [AD-784533] N75-10451
Analysis of chemical lasers. Volume 4: Method of characteristics laser and mixing program [MOC-LAMP] theory and user's guide [AD-784534] N75-10452
Low loss window materials for chemical lasers [AD-784326] N75-10453

CHEMICAL REACTION CONTROL
Lasers in chemistry [AD-783049] N75-10454

CHEMICAL REACTIONS
Production of edible carbohydrates from formaldehyde in a spacecraft. pH variations in the calcium hydroxide catalyzed formose reaction [NASA-CR-140684] N75-10181
Operation of air cathodes in the presence of hydrazine [AD-783241] N75-10611

CHESAPEAKE BAY [US]
Skylab-EREP investigations of wetlands ecology --- New Jersey and Chesapeake Bay [E74-10816] N75-10542
A survey for the use of remote sensing in the Chesapeake Bay region [NASA-CR-137476] N75-10571

CHROMIUM ALLOYS
Thermal-structural evaluation of TD Ni-20Cr thermal protection system panels [NASA-CR-132487] N75-10155
Directionally solidified Co-Cr-C composites. Microstructure and strength between 20 C and 1050 C obtained by different solidification modes [RAE-LIB-TRANS-1764] N75-10187
The effect of the titanium content on the active corrosion of ferritic r-steels and austenitic Cr-Ni-steels in sulfuric acid [NASA-TT-F-15994] N75-10211

CHROMIUM COMPOUNDS
Novel materials for power systems. Part 1: Schizophrenic catalysts --- oxidation of carbon monoxide and reduction of nitrogen oxides over chromium catalysts [AD-784447] N75-10203

CHRONOLOGY
Astronautics and aeronautics, 1972 --- a chronology of events [NASA-SP-4017] N75-10129

CINETHEODOLITES
Real-time cinetheodolite data system [RTCDS] for Yuma Proving Ground [AD-781969] N75-10426

CIRCUIT RELIABILITY
Fungus and corrosion induced failure mechanisms --- in electronic equipment circuitry [AD-783361] N75-10479

CIRCULAR CYLINDERS
Turbulence induced changes in vortex shedding from a circular cylinder N75-10336

CIRCULAR PLATES
Natural convection flow visualization and heat transfer from a horizontal circular disk [AD-783793] N75-10845

CITIES
Recycling of plastics from urban and industrial refuse [BM-RI-7955] N75-10267

CIVIL AVIATION
Proposed international air shuttle, 1975 [GPO-31-527] N75-10034
Total energy use for commercial aviation in the US [ORNL-NSF-EP-68] N75-10039

CLADDING
Coatings for protecting metals under high-temperature heating and deformation [AD-783566] N75-10465

CLASSIFICATIONS
Pattern recognition relevant to reconnaissance and remote sensing --- noting classification methods [PHL-1974-23] N75-10573
The PUCE programme for terrain evaluation for engineering purposes. 2: Procedures for terrain classification [PB-233847/3] N75-10625

CLAYS
Geochemical activity of soil microorganisms as an integral part of biogeocenosis [NASA-TT-F-15976] N75-10565

CLEAN ENERGY
Evaluation of coal conversion processes to provide clean fuels, part 1 --- coal conversion to clean fuels [PB-234202/0] N75-10600

CLEAR AIR TURBULENCE
Finite-amplitude waves in a stratified jet stream and clear air turbulence [NASA-TT-F-16002] N75-10628

CLIMATOLOGY
Atmospheric and climatological research progress N75-10632

CLIMBING FLIGHT
Optimum rate of climb for high performance aircraft [AD-784112] N75-10076

CLINICAL MEDICINE
A simple method for the generation of organ and vessel contours from roentgenographic or fluoroscopic images [NASA-CR-140685] N75-10693

CLOUD COVER
Statistical estimation of the light pulse deformation in the optical sounding of plane-stratified clouds [AD-784245] N75-10654

CLOUD PHOTOGRAPHY
Application of satellite cloud brightness data for large scale tropical analysis: A correlation study of brightness and 200-MB divergence [AD-784366] N75-10652

CLOUD PHYSICS
Studies in atmospheric electricity [TT-74-50008] N75-10623

CLOUD SEEDING
Characteristics of frontal cloud layers suitable for influence [AD-783977] N75-10631
Jemez atmospheric water resources research project, Volume 1: Summary and accomplishments --- cloud seeding evaluation [PB-234005/7] N75-10657
Jemez atmospheric water resources research project. Volume 2: Special aspects of the program [PB-234006/5] N75-10658

COAL
Automated strip mine and reclamation mapping from ERTS --- Ohio coal N75-10556
Evaluation of coal conversion processes to provide clean fuels, part 1 --- coal conversion to clean fuels [PB-234202/0] N75-10600
Evaluation of coal conversion processes to provide clean fuels, part 2 [PB-234203/8] N75-10604
Three suggested methods of controlling air pollution in the US and their probable economic impact on the domestic coal industry N75-10614

COAL GASIFICATION
Coal processing: Gasification, liquefaction, desulfurization: A bibliography, 1930 - 1974 [TID-3349] N75-10578
Preliminary evaluation of underground coal gasification at Hanna, Wyoming [BM-TPR-82] N75-10599
Char oil energy development [PB-233263/3] N75-10603

COAL LIQUEFACTION
Coal processing: Gasification, liquefaction, desulfurization: A bibliography, 1930 - 1974 [TID-3349] N75-10578

COAL UTILIZATION
The National Coal Conversion Act and the National Crude Oil Refinery Development Act [GPO-28-964] N75-10861

COASTAL WATER
A review of initial investigations to utilize ERTS-1 data in determining the availability and distribution of living marine resources --- harvest and management of fisheries resources in Mississippi Sound and Gulf waters N75-10555
Coastal upwelling ecosystems analysis. Data report 13: Radiation measurements off the Oregon coast July/August 1973 [PB-233958/8] N75-10676

COAXIAL FLOW
Magnetogasdynamic compression of a coaxial plasma accelerator flow for micrometeoroid simulation [NASA-TR-R-435] N75-10799

COAXIAL PLASMA ACCELERATORS
Magnetogasdynamic compression of a coaxial plasma accelerator flow for micrometeoroid simulation
[NASA-TR-R-435] N75-10799
Acceleration of ions in heavy-current electron beams
[AD-782085] N75-10811
COBALT ALLOYS
Directionally solidified Co-Cr-C composites. Microstructure and strength between 20 C and 1050 C obtained by different solidification modes
[RAE-LIB-TRANS-1764] N75-10187
Selection of composition and heat treatment of cast magnetic alloys
[AD-783765] N75-10237
COCKPITS
High acceleration cockpits for advanced fighter aircraft. Volume 1: Program summary --- human factors engineering for optimal design
[AD-783600] N75-10064
High acceleration cockpits for advanced fighter aircraft. Volume 2: Crew station design/integration --- control and display devices
[AD-783601] N75-10065
High acceleration cockpits for advanced fighter aircraft. Volume 3: Test plan --- static tests and mission profiles
[AD-783602] N75-10066
High acceleration cockpits for advanced fighter aircraft. Volume 4: Test results
[AD-783603] N75-10067
CODING
Algorithms and logical networks
[AD-783426] N75-10727
The application of coding to improve the yield and reliability of semiconductor memories --- using large scale integration
N75-10821
COHERENT ELECTROMAGNETIC RADIATION
High frequency electromagnetic wave backscattering from radially inhomogeneous dielectric spheres
N75-10742
COHERENT LIGHT
Coherent optical filtering methods in the object and space frequency domain [experiments, theory and critical considerations for application in the fields of character reading and pattern recognition]
[BMFT-FB-T-74-08] N75-10728
COHERENT RADAR
Aircraft-velocity measurement through radar-altimeter echo with noncoherent detection
[SLA-74-112] N75-10290
COLD ROLLING
Use of electroslag technique in manufacture of cold-rollers
N75-10218
COLD WEATHER
Cold: Physiology, protection and survival
[AGARD-AG-194] N75-10706
COLLISIONLESS PLASMAS
Turbulent magnetic fields in a collision dominated plasma
[PSU-IRL-SCI-432] N75-10800
COLLOIDAL GENERATORS
Parametric investigation of a linear edge colloid thruster
[ESRO-CR[P]-485] N75-10174
COLLOIDAL PROPELLANTS
On power conditioning for satellite stabilisation thrusters
[RAE-LIB-TRANS-1771] N75-10158
COLOR PHOTOGRAPHY
Some problems of aerial photographic surveying employing color and spectrozonal photographic materials
[AD-784147] N75-10430
Evaluation of Skylab imagery as an information service for investigating land use and natural resources --- Long Island, New York
[E74-10730] N75-10526
COLOR VISION
Alterations of color sensation under hypoxic conditions
[NASA-TT-F-15879] N75-10686
COLORADO
Geologic and mineral and water resources investigations in Western Colorado, using Skylab EREP data
[E74-10802] N75-10530
An interdisciplinary analysis of multispectral satellite data for selected cover types in the Colorado Mountains, using automatic data processing techniques
[E74-10803] N75-10531
Economic impact of the oil shale industry in western Colorado
[GPO-28-608] N75-10598
COMBINATORIAL ANALYSIS
Module level diagnosis of combinational networks
N75-10740
COMBUSTION
Laser-interaction studies. Part 1: A theoretical investigation of laser supported combustion waves. Part 2: Measurements of the effect of particulate, matter on air breakdown by 1.06 micron
[AD-784356] N75-10436
COMBUSTION EFFICIENCY
About the use of lithium-containing propellants in rocket propulsion units with FLOX as oxidizer. Part 1: Parameter study --- with hydrocarbon binders
[ESRO-TT-87] N75-10263
Asymmetric grain evaluation computer program --- for solid rocket propellant
[AD-784350] N75-10264
COMBUSTION PHYSICS
Application of multispectral color photography to flame flow visualization
[DLR-MITT-74-23] N75-10420
COMBUSTION PRODUCTS
Fire detection: The state-of-the-art --- a description of instruments for detecting outputs of the combustion process
[NASA-CR-140653] N75-10404
COMET HEADS
Calculation of NO and CO molecular spectra in the coma of a comet --- related to Kohoutek UV spectrum measurements
[MPI-PAE/EXTRATERR-98] N75-10880
COMMAND AND CONTROL
T and E guidelines for command and control systems
[AD-784550] N75-10301
COMMERCE
Market performance and competition in the petroleum industry, part 2
[GPO-28-740] N75-10855
Elimination of duty on methanol imported for certain uses
[H-REPT-93-998] N75-10857
High Seas Oil Port Act
[H-REPT-93-1042] N75-10858
COMMERCIAL AIRCRAFT
A methodology for determining the flight system mix of an air transfer route structure --- modeling for aircraft operation profitability
N75-10033
The attainable goal in airline safety
N75-10035
COMMUNICATION EQUIPMENT
In-harbor and at-sea electromagnetic compatibility survey for maritime satellite L-band shipboard terminal
[NASA-CR-139131] N75-10284
COMMUNICATION SATELLITES
Traveling wave tube lineariser --- for communication satellites
[ESRO-CR[P]-489] N75-10323
COMPONENT RELIABILITY
Present-day status of accelerated testing of trimming potentiometers
[ESRO-CR-167] N75-10472
Present-day status of accelerated testing of fixed capacitors
[ESRO-CR-168] N75-10473
Present-day status of accelerated testing of integrated circuits
[ESRO-CR-169] N75-10474
An investigation of the experience and implications of using non Hi-Rel components in European scientific experiments. Volume 1: Summary
[GT-7310-VOL-1] N75-10476
An investigation of the experience and implications of using non Hi-Rel components in European scientific experiments. Volume 2: Main report
[GT-7310-VOL-2] N75-10477
Present-day status of accelerated testing of fixed resistors
[ESRO-CR-166] N75-10478
COMPOSITE MATERIALS
Elastic pitch beam tail rotor operational suitability investigation
[AD-784595] N75-10069
Laboratory development and tensile testing of graphite/glass/epoxy hybrid composite materials
[AD-783860] N75-10190
Minimum-weight designs for hat-stiffened composite panels under uniaxial compression
[NASA-TN-D-7779] N75-10497
Interaction between parallel cracks in layered composites
[WB-5/73] N75-10501
COMPRESSED GAS
One method of numerical solution of the Navier-Stokes equations for a compressible gas
[NASA-TT-F-15992] N75-10355
COMPRESSIBILITY EFFECTS
Critical review of methods to predict the buffet capability of aircraft
[AGARD-R-623] N75-10053
A simple method of calculating power-law velocity profile exponents from experimental data --- for boundary layer shape factor
[NASA-TM-X-72000] N75-10356
COMPRESSIBLE FLOW
A calculation method for the turbulent boundary layer on an infinite yawed wing in compressible, adiabatic flow
[ARC-CP-1268] N75-10024
Remarks about the influence of density fluctuations in turbulent boundary layers for compressible flow
[NASA-TT-F-15989] N75-10353
Two-dimensional flow inside MHD ducts with transverse asymmetries
N75-10364
Second order boundary layer theory for steady, laminar, compressible flow on curved surfaces
[ESRO-TT-85] N75-10384
COMPRESSING
Quantitative analysis of the influence of contaminants on thermocompression bonding of gold
[SLA-73-1099] N75-10228
Technique for testing the tensile strength of thermocompression bonds
[SLA-74-93] N75-10470
COMPRESSION LOADS
Acoustical studies of sound-producing sands --- acoustic properties of sand grains under compression loads
[NASA-TT-F-15715] N75-10752
COMPRESSION TESTS
Particle size distribution effects in precipitation hardening
[UCLA-34-P-172-11] N75-10232
A computer program for plotting stress-strain data from compression, tension, and torsion tests of materials
[NASA-TM-X-3091] N75-10485
COMPRESSOR ROTORS
Statement of the two-dimensional nonstationary problem of thermal conductivity for a bladed wheel of a gas turbine
[AD-784709] N75-10096
Comparative measurements behind a compressor rotor with a space-bound and corotating cylindrical probes
[NASA-TT-F-15833] N75-10352
COMPRESSORS
Propagation of waves in elliptic ducts. A theoretical study --- in view of jet engine compressor noise reduction
[NASA-CR-140652] N75-10378
COMPUTER GRAPHICS
CRYSNET: A network of intelligent remote graphics terminals
[BNL-18772] N75-10716
Using the OCS complot DP-1 plotter
[NASA-CR-140602] N75-10722
COMPUTER PROGRAMMING
Glossary of documentation terms. Part 2: Computer-user terms
[AGARD-AG-182-PT-2] N75-10713
Research-study of a self-organizing computer
[NASA-CR-140599] N75-10715
Computer functional requirements study, volume 1
[AD-782078/0] N75-10719
Development of programs for computing characteristics of ultraviolet radiation
[NASA-CR-139134] N75-10746
Image enhancement techniques: Electron microprobe experiment
[SLL-73-292] N75-10787
COMPUTER PROGRAMS
Analysis of chemical lasers. Volume 1: Laser and mixing program lamp theory and user's guide
[AD-784531] N75-10449
Analysis of chemical lasers. Volume 3: One dimensional laser and mixing program guide
[AD-784533] N75-10451
Analysis of chemical lasers. Volume 4: Method of characteristics laser and mixing program [MOC-LAMP] theory and user's guide
[AD-784534] N75-10452
A computer program for plotting stress-strain data from compression, tension, and torsion tests of materials
[NASA-TM-X-3091] N75-10485
SPAR reference manual --- for stress analysis
[NASA-CR-120504] N75-10495
SPAR demonstration problems --- for stress analysis
[NASA-CR-120505] N75-10496
Computer program for nonlinear regression using least squares
[BM-IC-8649] N75-10720
COMPUTER STORAGE DEVICES
Memory systems for signal generating photoelectric image detectors
[NASA-CR-140669] N75-10408
COMPUTER SYSTEMS DESIGN
Computer functional requirements study, volume 1
[AD-782078/0] N75-10719
COMPUTER TECHNIQUES
C-LAD: A low cost LORAN-C assist device. Volume 1: Hardware --- application of digital computer for increased ship navigation accuracy
[AD-784312] N75-10049
C-LAD: A low cost LORAN-C assist device. Volume 3: Operating procedure --- application of digital computer for increased ship navigation accuracy
[AD-784314] N75-10051
HAL/S language specification
[NASA-CR-140279] N75-10101
HAL/S-360 user's manual
[NASA-CR-140255] N75-10102

Evaluation of Skylab imagery as an information service for investigating land use and natural resources --- Long Island, New York
[E74-10730] N75-10526
Remote sensing of ocean current boundary layer --- Florida
[E74-10801] N75-10529
An interdisciplinary analysis of multispectral satellite data for selected cover types in the Colorado Mountains, using automatic data processing techniques
[E74-10803] N75-10531
Glossary of documentation terms. Part 2: Computer-user terms
[AGARD-AG-182-PT-2] N75-10713
A communication link between the GIM data base and a general application program
[NASA-CR-140304] N75-10721
Application of digital computer techniques to rectification and enhancement of astronomical images
[NASA-CR-140701] N75-10878

COMPUTERIZED DESIGN
HAL/S language specification
[NASA-CR-140279] N75-10101
WINDOWAC [Wing Design Optimization With Aeroelastic Constraints]: Program manual
[NASA-TM-X-3071] N75-10484

COMPUTERIZED SIMULATION
A practical on-line filter to process gyrocompass data
[AD-783250] N75-10048
Real-time simulation of the TF30-P-3 turbofan engine using a hybrid computer
[NASA-TM-X-3106] N75-10095
Modeling and analysis of power processing systems: Feasibility investigation and formulation of a methodology
[NASA-CR-134686] N75-10150
Atomic crack simulation in fracture mechanics
[AD-783724] N75-10243
The interaction between line force arrays and planar cracks
[AD-783704] N75-10244
Reliable results from stochastic simulation models
[USDA-NE-277] N75-10735

CONDENSING
Nitrogen condensation in a sonic orifice expansion flow
[AD-783254] N75-10399

CONDUCTION
Solar energy absorber
[NASA-CASE-MFS-22743-1] N75-10585

CONDUCTION ELECTRONS
Conduction electrons and magnetism
[AD-783401] N75-10839

CONFERENCES
EUROMECH 46: Numerical and experimental investigations of the stability of boundary layers
[AD-783568] N75-10391
Low cycle high temperature fatigue --- in aircraft jet engines: conference proceedings
[AGARD-CP-155] N75-10487
Third Earth Resources Technology Satellite Symposium. Volume 2: Summary of results
[NASA-SP-356] N75-10549
Proceeding of the Colloquium on Technology Transfer
[AD-782723] N75-10852

CONFIDENCE LIMITS
Optimal confidence intervals for the standard deviation of a normal distribution
[ARL/SM-NOTE-406] N75-10737

CONGRESS
Proposed international air shuttle, 1975
[GPO-31-527] N75-10034
Limit lead in gasoline
[GPO-29-660] N75-10259
Earthquakes
[GPO-28-577] N75-10516
Research, development, and the energy crisis
[GPO-27-032] N75-10580
Independent truckers and the energy crisis
[GPO-31-412] N75-10581
Economic impact of the oil shale industry in western Colorado
[GPO-28-608] N75-10588
National Environmental Policy Act of 1969. Environmental indices, status of development pursuant to Sections 102[2][B] and 204 of the act
[GPO-25-314] N75-10617
Advanced nuclear research
[GPO-41-253] N75-10764
Effects of energy crisis on education, 1974
[GPO-27-765] N75-10850
Third annual report on the financial condition and results of the operation of the Airport and Airway Trust Fund
[H-DOC-93-230] N75-10854
Market performance and competition in the petroleum industry, part 2
[GPO-28-740] N75-10855
Elimination of duty on methanol imported for certain uses
[H-REPT-93-998] N75-10857
High Seas Oil Port Act
[H-REPT-93-1042] N75-10858
Public works for water and power development and Atomic Energy Commission Appropriation Bill, 1975. Part 6: Tennessee Valley Authority
[GPO-32-403] N75-10859
National Crude Oil Refinery Development Act, part 2
[GPO-35-578] N75-10860
The National Coal Conversion Act and the National Crude Oil Refinery Development Act
[GPO-28-964] N75-10861
Metric conversion act of 1973
[GPO-27-065] N75-10862
New motor vehicle emission standards and fuel economy
[GPO-29-272] N75-10863
Implementation of the Noise Control Act of 1972 [aircraft-airport noise], part 2
[GPO-33-871] N75-10864
Oil and Gas Energy Tax Act of 1974
[H-REPT-93-1028-PT-2] N75-10866

CONSTANTS
Physical constants and conversion factors
[AD-782701] N75-10733

CONSTRAINTS
Planetary quarantine: Space research and technology
[NASA-CR-140800] N75-10707

CONSTRUCTION MATERIALS
Coatings for protecting metals under high-temperature heating and deformation
[AD-783566] N75-10465
Optimal materials systems for frame buildings subjected to solar heating --- computerized selection of laminate materials
N75-10480

CONTAMINANTS
Studies of pollutant concentration frequency distributions --- statistical techniques for air quality control
N75-10613
Test program on the contamination of ultraviolet region mirrors by Apollo Telescope Mount materials
[NASA-CR-120516] N75-10772

CONTAMINATION
Contamination effects in a laminar proportional amplifier
[AD-782244] N75-10396
Profile and contamination of an electron beam
[NOTA-INTERNA-542] N75-10766

CONTINUUM MECHANICS
Methods of finite elements in analyses of continuous and combined constructions
[AD-783969] N75-10508

CONTOURS
A simple method for the generation of organ and vessel contours from roentgenographic or fluoroscopic images
[NASA-CR-140685] N75-10693
Two FORTRAN contouring routines
[NPL-NAC-47] N75-10724

CONTROL
Effects of reaction control system jet flow field interactions on the aerodynamic characteristics of a 0.010-scale space shuttle orbiter model in the Langley Research Center 31 inch CFHT [OA85]
[NASA-CR-134111] N75-10148

CONTROL STABILITY
Effect of ELEVON gap configurations on the longitudinal stability and control effectiveness of the 43-0 space shuttle orbiter [OA118]
[NASA-CR-134407] N75-10152

CONTROL STICKS
Hybrid electrohydraulic stick-force simulator
[RAE-LIB-TRANS-1751] N75-10110

CONTROL SURFACES
Performance improvement through control configured vehicle concept --- active control systems for aircraft life augmentation
[NASA-TT-F-15998] N75-10059
The CCV concept and specifications
[NASA-TT-F-15997] N75-10060

CONTROL THEORY
Optimal control theory investigation of propror/wing response to vertical gust
[NASA-TM-X-62384] N75-10057
Modern sampled-data control theory: Design of the Large Space Telescope
[NASA-CR-2457] N75-10875

CONVECTION
Outer layers of white dwarf stars --- the relation of convection to luminousity
N75-10870

CONVECTION CURRENTS
Turbulence studies on a high-altitude sounding aircraft --- studies of convective processes turbulence, and wave propagation in the atmosphere
[NASA-TT-F-16003] N75-10622

CONVECTIVE FLOW
Natural convection flow visualization and heat transfer from a horizontal circular disk
[AD-783793] N75-10845

CONVERSION TABLES
Tables and conversions for microclimatology
[PB-234158/4] N75-10655

COOLERS
Electroslag remelting
[JPRS-63220] N75-10212
Some characteristics of EShP of metal in consumable crystallizers
N75-10220

COORDINATE TRANSFORMATIONS
On changes of variables in kinetic theory
[TRITA-EPP-74-11] N75-10806

COORDINATES
Geodetic results from ISAGEX data --- for obtaining center of mass coordinates for geodetic camera sites
[NASA-TM-X-70763] N75-10567

COPPER
Ultrasonic welding of electrical terminations
[BDX-613-1016] N75-10460

COPPER ALLOYS
Fatigue endurance, crack sensitivity and nucleation characteristics of structural elements in four aluminium-copper alloys
[ARC-CP-1259] N75-10503

CORE STORAGE
Memory systems for signal generating photoelectric image detectors
[NASA-CR-140669] N75-10408

CORIOLIS EFFECT
Motion sickness
[NASA-TT-F-15864] N75-10685

CORRELATION
Multiaxial fatigue. Present and future methods of correlation
N75-10492
Methods of investigation for manual control processes
[FB-15] N75-10738

CORROSION
The effect of the titanium content on the active corrosion of ferritic r-steels and austenitic Cr-Ni-steels in sulfuric acid
[NASA-TT-F-15994] N75-10211

CORRUGATING
Mechanism of formation of corrugations on the surface of electroslag ingots
N75-10221

COSMIC RAYS
The composition of cosmic rays with Z greater than or equal to 12 --- detected during high altitude balloon flight
N75-10897

COST ANALYSIS
Heat pipe manufacturing study
[NASA-CR-139140] N75-10347
Outpatient medical costs related to air pollution in the Portland, Oregon area
[EPA-600/5-74-017] N75-10692
The social cost of airport noise as measured by rental changes: The case of Logan Airport
N75-10849

COST EFFECTIVENESS
A methodology for determining the flight system mix of an air transfer route structure --- modeling for aircraft operation profitability
N75-10033
Profitability analysis of producing crude oil by waterflooding using a simulation technique --- computer estimated costs of water injection technique
[BM-IC-8652] N75-10582

COUPLERS
A study of beam couplers for integrated optics
[AD-784514] N75-10793

CRACK INITIATION
Hydrogen brittleness in hydrogen and hydrogen-oxygen gas mixtures
[COO-3166-6] N75-10231

CRACK PROPAGATION
Hydrogen brittleness in hydrogen and hydrogen-oxygen gas mixtures
[COO-3166-6] N75-10231
Atomic crack simulation in fracture mechanics
[AD-783724] N75-10243

CRACKING [FRACTURING]
Interaction between parallel cracks in layered composites
[WB-5/73] N75-10501
Activities of the Solid State Technology Institute
N75-10502
Fatigue endurance, crack sensitivity and nucleation characteristics of structural elements in four aluminium-copper alloys
[ARC-CP-1259] N75-10503

CRACKS
An experimental investigation of unsymmetric crack tip deformation fields in materials with nonuniform properties
[AD-784136] N75-10504

CREEP PROPERTIES
An overview of high temperature metal fatigue: Aspects covered by the 1973 International Conference on Creep and Fatigue
N75-10489
Structure dependence of high temperature deformation of metals
[SU-326-P-17-X-5] N75-10498

CRITICAL TEMPERATURE
An analysis of the spectral distribution of light quasi-elastically scattered from high molecular weight polymer solutions in the lower critical temperature region
N75-10250

CROSS FLOW
Heat transfer characteristics of an impinging jet in a crossflow
N75-10344

CRUDE OIL
Geochemistry of liquids, gases, and rocks from the Smackover formation
[PB-233427/4] N75-10525
Profitability analysis of producing crude oil by waterflooding using a simulation technique --- computer estimated costs of water injection technique
[BM-IC-8652] N75-10582
Market performance and competition in the petroleum industry, part 2
[GPO-28-740] N75-10855
High Seas Oil Port Act
[H-REPT-93-1042] N75-10858
National Crude Oil Refinery Development Act, part 2
[GPO-35-578] N75-10860
The National Coal Conversion Act and the National Crude Oil Refinery Development Act
[GPO-28-964] N75-10861
Oil and Gas Energy Tax Act of 1974
[H-REPT-93-1028-PT-2] N75-10866

CRYOGENICS
Helium at zero temperature with hard-sphere and other forces
[COO-3077-35] N75-10182
Heat transport in porous insulations at cryogenic temperatures
N75-10339

CRYSTAL DEFECTS
Crystals and radiation: New horizons in the search for scientific knowledge
[AD-784721] N75-10201
The interaction between line force arrays and planar cracks
[AD-783704] N75-10244

CRYSTAL GROWTH
The mobility of coincidence and near coincidence grain boundaries
[AD-782908] N75-10236
Continuous silicon solar cells
[PB-233949/7] N75-10602
Molecular beam epitaxy of 2-4 compound waveguides
[AD-784650] N75-10837

CRYSTAL OPTICS
Electroluminescence of crystals
N75-10822

CRYSTAL OSCILLATORS
Frequency standard stability for Doppler measurements on-board the shuttle
[NASA-TM-X-72030] N75-10156

CRYSTAL STRUCTURE
Transition metal oxides: Crystal chemistry, phase transition and related aspects
[NSRDS-NBS-49] N75-10193

CRYSTALLIZATION
Some characteristics of the thermal operation of an electroslag remelting furnace crystallizer with a broadened slag top
N75-10213
Indirect determination of specific heat fluxes in the crystallizer wall during EShP
N75-10214
Electroslag remelting in multipass crystallizers
N75-10216
Use of electroslag technique in manufacture of cold-rollers
N75-10218
Some characteristics of EShP of metal in consumable crystallizers
N75-10220

CRYSTALLOGRAPHY
CRYSNET: A network of intelligent remote graphics terminals
[BNL-18772] N75-10716

CURVATURE
Overall study on mechanics of leveling and straightening
[SERIAL-149-VOL-23-NO-6] N75-10483

CYCLIC LOADS
Low cycle high temperature fatigue --- in aircraft jet engines: conference proceedings
[AGARD-CP-155] N75-10487
Problems of low cycle high temperature fatigue in aircraft jet engines
N75-10488
Precision in LCHTF testing --- of aircraft jet engines
N75-10490
The effect of cycle parameters on high temperature low cycle fatigue --- in aircraft jet engines
N75-10491
Design procedures for elevated temperature low-cycle fatigue --- as applied to aircraft jet engines
N75-10494

CYGNUS CONSTELLATION
Infrared, radio, and X-ray observations of Cygnus X-3
[NASA-CR-140680] N75-10882

CYLINDRICAL BODIES
Added mass and damping of a vibrating rod in confined viscous fluids
[ANL-CT-75-08] N75-10349

CYLINDRICAL SHELLS
Response of a finite cylindrical shell to a cosine impulse over half its circumference
[SLA-73-5827] N75-10499
Loss of stability of a cylindrical shell on longitudinal impact
[AD-783570] N75-10505

D

D-1 SATELLITE
Observation equations for resonance parameters of the 13th Order from the orbit analysis of GEOS B, BE-C, and D1D satellites
[SER-C/DISS-198] N75-10132

DAMPING TESTS
A study of the damping characteristics on models of supersonic air lines at supersonic speeds
[AD-784259] N75-10077

DATA ACQUISITION
Real-time cinetheodolite data system [RTCDS] for Yuma Proving Ground
[AD-781969] N75-10426

DATA BASES
A communication link between the GIM data base and a general application program
[NASA-CR-140304] N75-10721

DATA COLLECTION PLATFORMS
Study of the feasibility of using a sailplane as an instrument platform for the study of wake vortex phenomena
[NASA-CR-140603] N75-10086
Precision Pointing Control System [PPCS] system design and analysis --- for gimbaled experiment platforms
[NASA-CR-139132] N75-10157
Surface water modeling Everglades Water Basin, Florida
[E74-10814] N75-10540
ERTS program of the US Army Corps of Engineers --- water resources
N75-10554

DATA COMPRESSION
A study on data-compression techniques
[ESRO-CR-93] N75-10717

DATA CONVERSION ROUTINES
S-193 scatterometer transfer function analysis for data processing
[NASA-CR-140314] N75-10569

DATA LINKS
In-harbor and at-sea electromagnetic compatibility survey for maritime satellite L-band shipboard terminal
[NASA-CR-139131] N75-10284
A communication link between the GIM data base and a general application program
[NASA-CR-140304] N75-10721

DATA MANAGEMENT
Empirical investigation of reordering and data management for finite element systems of equations
[ANL-8056] N75-10732

DATA PROCESSING
Data analysis support for UNH gamma ray detector on OSO-7
[NASA-CR-140597] N75-10139
Information processing for target-detection and identification
[AD-783229] N75-10304
Methods of coherent optics and holography applied to problems in antenna engineering and data processing
[AD-784337] N75-10433
JSC earth resources data analysis capabilities available to EOD revision B
[NASA-TM-X-72029] N75-10570
Automation of the hydrometeorological service
[AD-782822] N75-10642
Triad computer
[AD-784372] N75-10718
Set theoretic approach to data type extension
[LA-UR-73-1287] N75-10726
Versatile data handling system study
[NASA-CR-139123] N75-10853

DATA PROCESSING TERMINALS
CRYSNET: A network of intelligent remote graphics terminals
[BNL-18772] N75-10716

DATA REDUCTION
Physical constants and conversion factors
[AD-782701] N75-10733

DATA SYSTEMS
TDRSS data handling and management system study. Ground station systems for data handling and relay satellite control
[NASA-CR-139128] N75-10289
Data coordination plan for the GATE Operations Control Centre [GOCC]
N75-10637
Versatile data handling system study
[NASA-CR-139123] N75-10853

DAYTIME
Investigations on the day-night-differences of physical performance capacity
[DLR-FB-74-29] N75-10697

DECISION MAKING
Trajectory selection for the Mariner Jupiter/Saturn 1977 project
[NASA-CR-140704] N75-10142

DEEP SPACE NETWORK
Orbit determination for deep space missions by means of Doppler and ranging
[ESRO-TT-80] N75-10146

DEFLECTION
Laser beam deflection --- using acousto-optical grating
[BBC-RD-1974/31] N75-10434
Large deflections of thin elastic plates
[AD-783047] N75-10512

DEFORMATION
Structure dependence of high temperature deformation of metals
[SU-326-P-17-X-5] N75-10498

DEHYDRATED FOOD
Food unit, based on reserves of dehydrated products, in life support systems for crews of spaceships during prolonged flights --- space flight feeding and spacecrew body weights
[AD-784289] N75-10710

DEHYDRATION
Dehydriding of titanium alloy [Ti-6246] hydrided powder
[AD-783235] N75-10249

DELTA LAUNCH VEHICLE
Skynet 2-b/Delta 105
[NASA-NEWS-RELEASE-74-303] N75-10124

DELTA WINGS
Measurements of dynamic stability derivatives of an ogive delta wing model at transonic and supersonic speeds
[FFA-TN-AU-925] N75-10019
Low-speed wing-tunnel measurements of the lift, drag and pitching moment of a series of cropped delta wings
[ARC-R/M-3744] N75-10030
A shock capturing method for calculating supersonic flow fields
[ARC-CP-1290] N75-10381

DEMAND [ECONOMICS]
A methodology for determining the flight system mix of an air transfer route structure --- modeling for aircraft operation profitability
N75-10033

DENSITY MEASUREMENT
Remarks about the influence of density fluctuations in turbulent boundary layers for compressible flow
[NASA-TT-F-15989] N75-10353

DEPOSITION
Accretion flows onto galactic X-ray sources
N75-10898

DESCRIPTIVE GEOMETRY
An extension of the combinatorial geometry technique for modeling vegetation and terrain features
[AD-782883] N75-10577

DESERTS
A study to explore the use of orbital remote sensing to determine native arid plant distribution --- Arizona Regional Ecological Test Site
[E74-10818] N75-10544

DESULFURIZING
Coal processing: Gasification, liquefaction, desulfurization: A bibliography, 1930 - 1974
[TID-3349] N75-10578
Evaluation of coal conversion processes to provide clean fuels, part 1 --- coal conversion to clean fuels
[PB-234202/0] N75-10600
Char oil energy development
[PB-233263/3] N75-10603
Evaluation of coal conversion processes to provide clean fuels, part 2
[PB-234203/8] N75-10604

DICTIONARIES
Glossary of documentation terms. Part 2: Computer-user terms
[AGARD-AG-182-PT-2] N75-10713

DIELECTRIC PROPERTIES
Dielectric constants and dissipation factors of simulated lunar rocks
[PB-234053/7] N75-10575
An experimental determination of long wavelength phonons and anomalous dielectric behavior in proustite and pyrargyrite
[AD-784309] N75-10841

DIELECTRICS
Problems in producing highest energy densities by organic capacitor dielectrics
[BMFT-FB-T-74-10] N75-10321
High frequency electromagnetic wave backscattering from radially inhomogeneous dielectric spheres
N75-10742

DIES
Using EShP to obtain cast electroslag forging billets
N75-10223
DIESEL ENGINES
Prospects of manufacturing crankshafts for ship's diesels by the electroslag casting method
N75-10217
DIESEL FUELS
Independent truckers and the energy crisis
[GPO-31-412] N75-10581
DIFFERENTIAL EQUATIONS
Quadratic differential systems: A study in nonlinear systems theory
N75-10739
DIFFUSION COEFFICIENT
Diffusion studies in nonmetallic system, part 1 --- formation of nickel alumina oxides
[AD-784437] N75-10246
DIFFUSION WELDING
Interdiffusion behavior of tungsten or rhenium and group 5 and 6 elements and alloys of the periodic table. Part 2A: Appendices A-G
[NASA-CR-134526] N75-10209
DIGITAL COMPUTERS
C-LAD: A low cost LORAN-C assist device. Volume 2: Software --- application of digital computer for increased ship navigation accuracy
[AD-784313] N75-10050
C-LAD: A low cost LORAN-C assist device. Volume 3: Operating procedure --- application of digital computer for increased ship navigation accuracy
[AD-784314] N75-10051
Digital modeling in statistical radio engineering
[AD-783732] N75-10294
Automation of the hydrometeorological service
[AD-782822] N75-10642
Conversion of a D17B [Minuteman 1] guidance computer to acquire and process evoked response information
N75-10714
Triad computer
[AD-784372] N75-10718
Application of digital computer techniques to rectification and enhancement of astronomical images
[NASA-CR-140701] N75-10878
DIGITAL FILTERS
A practical on-line filter to process gyrocompass data
[AD-783250] N75-10048
DIGITAL INTEGRATORS
Design of a mini-computer controlled digital integrated circuit tester
N75-10402
DIGITAL RADAR SYSTEMS
Design of digital moving target indication radar processors
N75-10278
DIGITAL SIMULATION
Direct statistical analysis of missile guidance systems via cadet [covariance analysis describing function technique]
[AD-783098] N75-10162
DIGITAL SYSTEMS
A conceptaul definition study for a digital avionics information system [approach 2], volume 1
[AD-780581/5] N75-10071
A conceptual definition study for a digital avionics information system [approach 2]. Volume 2: Appendixes A thru D
[AD-780582/3] N75-10072
Digital display of characteristic parameters of active radio frequency transmission systems
[AD-783806] N75-10302
Real time digital control of remote tracking instruments --- tracking radar
[SLA-74-5186] N75-10418
DIODES
Transistorized impulse generators in the millisecond range --- characteristics of relaxation wideband generators in dipole and field transistors
N75-10306
GaAs Large Optical Cavity [LOC] laser diode for communications receivers
[AD-784341] N75-10442
Present day status of accelerated testing of diodes and transistors
[ESRO-CR-170] N75-10475
DISCRETE FUNCTIONS
Determination of aerodynamic derivatives using the discrete Fourier transformation of transient oscillations
[DLR-FB-74-17] N75-10018
DISKS [SHAPES]
Characterization of metals melting discs Skylab experiment M551
[NASA-CR-129041] N75-10118
DISPLAY DEVICES
High acceleration cockpits for advanced fighter aircraft. Volume 2: Crew station design/integration --- control and display devices
[AD-783601] N75-10065
A conceptaul definition study for a digital avionics information system [approach 2], volume 1
[AD-780581/5] N75-10071
A conceptual definition study for a digital avionics information system [approach 2]. Volume 2: Appendixes A thru D
[AD-780582/3] N75-10072
Digital display of characteristic parameters of active radio frequency transmission systems
[AD-783806] N75-10302
NTC tracking display
[AD-783961] N75-10760
The impact of opto-electronics upon avionics --- development and application of electro-optical equipment with emphasis on system design
N75-10775
Display devices and their use in avionics systems --- factors affecting selection and performance of electro-optical sensors
N75-10778
A technique for displaying flight information in the field of view of binoculars for use by the pilots of radio controlled models
[NASA-TM-X-72015] N75-10786
DISTRIBUTION FUNCTIONS
A model for gas-surface distribution functions
[RM-591] N75-10829
DIVING [UNDERWATER]
Report on Project Hydrox 2
[AD-784446] N75-10701
DOCUMENTS
NSF-Rann energy abstracts: A monthly abstract journal of energy research
[ORNL-EIS-74-52-VOL-2-NO-1]
N75-10592
DOGS
High altitude pulmonary edema
[AD-782240] N75-10702
DOPPLER EFFECT
Orbit determination for deep space missions by means of Doppler and ranging
[ESRO-TT-80] N75-10146
Frequency standard stability for Doppler measurements on-board the shuttle
[NASA-TM-X-72030] N75-10156
Burst processor tapped delay line --- Doppler resolution filter
[AD-779473] N75-10331
Flow tracing fidelity of scattering aerosol in laser Doppler velocimetry
[NASA-CR-140671] N75-10357
DOSIMETERS
Foil activation analysis and thermoluminescent dosimetry on Skylab 2 --- for monitoring radiation levels
[AD-783779] N75-10704
DRAG
The external drag of fuselage side intakes: Rectangular intakes with compression surfaces vertical
[ARC-CP-1269] N75-10025
Results of a series of wind tunnel tests on the victor B.Mk.2 aircraft and a comparison with drag estimates and full scale flight data
[ARC-CP-1283] N75-10026
DRAG CHUTES
Slow descent recovery system technology study and data program
[AD-783268] N75-10032
DRAG MEASUREMENT
Scattering of background molecules in free jet expansions studied by free molecular flat plate drag measurements
[DLR-FB-74-16] N75-10379
Drag measurements on plates parallel to the flow, and on discs perpendicular to the flow, in supersonic highly rarefied free jets
[ESRO-TT-91] N75-10386
DRIFT RATE
The electronics of the plasma drift experiment S 329 in the GEOS satellite
[MPI-PAE/TB-EXTRATERR-10] N75-10320
DROPS [LIQUIDS]
The influence of aerodynamic parameters on the rate of erosion rate caused by the impact of a liquid droplet at the stagnation point of a body flying at supersonic speed
[ESRO-TT-86] N75-10374
DRUGS
Quantitative determination of benzo/a/pyrene in tar-containing drugs by an isotope dilution method
[NASA-TT-F-15983] N75-10194
DUCTS
Influence of the side walls on the turbulent centre-plane boundary layer in a square duct
[IC-AERO-74-06] N75-10382
DUST
Dust storms in the Altay territory --- U.S.S.R.
[AD-783664] N75-10643
Dust storms in the Transvolga
[AD-784174] N75-10663
Map diagram of the number of days with dust storms in the hot zone of the USSR and adjacent territories
[AD-784100] N75-10668
The frequency of the most intensive dust storms in the Ukraine
[AD-784101] N75-10669
DYNAMIC CHARACTERISTICS
Determination of the dynamic characteristics of a structure from a vibration test performed with only one excitation point --- exemplified for aircraft structures
N75-10371
DYNAMIC MODELS
The generation of saccadic eye movements in vestibular nystagmus --- computerized simulation of nystagmic response to acceleration
[AD-784128] N75-10700
DYNAMIC RESPONSE
A study of stabilization techniques for small, fixed-wing, remotely piloted aircraft
[AD-784109] N75-10079
Response of a finite cylindrical shell to a cosine impulse over half its circumference
[SLA-73-5827] N75-10499
Modern sampled-data control theory: Design of the Large Space Telescope
[NASA-CR-2457] N75-10875
DYNAMIC STABILITY
Measurements of dynamic stability derivatives of an ogive delta wing model at transonic and supersonic speeds
[FFA-TN-AU-925] N75-10019
Dynamic and static balancing gyroscopic equipment
N75-10401
DYNAMIC STRUCTURAL ANALYSIS
Aerospace Research
[ESRO-TT-40] N75-10367
Determination of the dynamic characteristics of a structure from a vibration test performed with only one excitation point --- exemplified for aircraft structures
N75-10371
DYNAMIC TESTS
Dynamic simulation facility for satellite attitude control systems --- Symphonie satellite
[BMFT-FB-W-74-02] N75-10159

E

EARTH RESOURCES PROGRAM
Investigation of land use of northern megalopolis using ERTS-1 imagery
[NASA-CR-2459] N75-10545
Third Earth Resources Technology Satellite Symposium. Volume 2: Summary of results
[NASA-SP-356] N75-10549
The Canadian ERTS program
N75-10550
Environmental surveys in Alaska based upon ERTS data
N75-10551
Geologic evaluation and applications of ERTS-1 imagery over Georgia
N75-10552
An evaluation of the suitability of ERTS data for the purposes of petroleum exploration --- Anadarko Basin in Oklahoma and Texas
N75-10553
ERTS program of the US Army Corps of Engineers --- water resources
N75-10554
A review of initial investigations to utilize ERTS-1 data in determining the availability and distribution of living marine resources --- harvest and management of fisheries resources in Mississippi Sound and Gulf waters
N75-10555
Automated strip mine and reclamation mapping from ERTS --- Ohio coal
N75-10556
Utility of ERTS for monitoring the breeding habit of migratory waterfowl --- United States and Canada
N75-10557
Agriculture, forestry, range resources
N75-10558
Water resources --- monitoring and management from ERTS-1 data
N75-10559
Land use and mapping
N75-10560
Mineral resources, geological structures, and landform surveys
N75-10561
JSC earth resources data analysis capabilities available to EOD revision B
[NASA-TM-X-72029] N75-10570
EARTH RESOURCES TECHNOLOGY SATELLITE 1
ERTS 1 flight evaluation report, 23 October 1973 - 23 January 1974 --- orbits 6371 to 7651
[NASA-CR-140712] N75-10546
ERTS 1 flight evaluation report, 23 January - 23 April 1974 --- orbits 7652 to 8907
[NASA-CR-140810] N75-10547
ERTS 1 flight evaluation report, January 23, 1973 to April 23, 1973 --- analysis of ERTS-1 systems during orbits 2600-3810
[NASA-CR-140809] N75-10548

ERTS 1 flight evaluation report, 23 April 1974 23 July 1974 --- orbits 8908 to 10182
[NASA-CR-140711] N75-10568

EARTH SURFACE
Orbital geology --- an aid to mineral exploration and mapping the earth's surface
[NASA-TT-F-16000] N75-10887

EARTHQUAKES
Earthquakes
[GPO-28-577] N75-10516
United States earthquakes, 1972
N75-10520

ECOLOGY
Skylab-EREP investigations of wetlands ecology --- New Jersey and Chesapeake Bay
[E74-10816] N75-10542

ECONOMIC ANALYSIS
Some factors affecting the use of lighter than air systems --- economic and performance estimates for dirigibles and semi-buoyant hybrid vehicles
[NASA-TM-X-62374] N75-10004
An economic analysis of oil shale operations featuring gas combustion retorting
[BM-TPR-81] N75-10579
The economics of using wind power for electricity supply in the Netherlands and for water supply on Curacao
[NASA-TT-F-15982] N75-10587

ECONOMIC FACTORS
Three suggested methods of controlling air pollution in the US and their probable economic impact on the domestic coal industry
N75-10614
Market performance and competition in the petroleum industry, part 2
[GPO-28-740] N75-10855
Economy in design operations --- concering the development of technological products
[JPRS-63034] N75-10856
Elimination of duty on methanol imported for certain uses
[H-REPT-93-998] N75-10857

ECOSYSTEMS
Ecological effects and environmental fate of solid rocket exhaust
[NASA-CR-140598] N75-10616

EDEMA
High altitude pulmonary edema
[AD-782240] N75-10702

EDGE DISLOCATIONS
Analytical modeling of defects in solids --- including edge dislocations and microcracks
N75-10824

EDUCATION
Effects of energy crisis on education, 1974
[GPO-27-765] N75-10850

ELASTIC DEFORMATION
Mechanics of a deformed solid
[AD-784209] N75-10514

ELASTIC MEDIA
Analysis of spectral density curves in wind tunnel flutter measurements
N75-10017

ELASTIC PLATES
Large deflections of thin elastic plates
[AD-783047] N75-10512

ELASTIC PROPERTIES
Mechanics of a deformed solid
[AD-784209] N75-10514

ELASTIC SCATTERING
An analysis of the spectral distribution of light quasi-elastically scattered from high molecular weight polymer solutions in the lower critical temperature region
N75-10250

ELASTOHYDRODYNAMICS
Study to define behavior of liquid lubricants in an elastohydrodynamic contact
[NASA-CR-134671] N75-10455

ELASTOMERS
Endurance testing of an LM-726-4 elastomeric pitch change bearing
[AD-784140] N75-10074

ELASTOPLASTICITY
An experimental investigation of unsymmetric crack tip deformation fields in materials with nonuniform properties
[AD-784136] N75-10504

ELECTRIC CONDUCTORS
Vibration and stability of structures with high electric currents
N75-10309

ELECTRIC CONTACTS
Accelerated lifetesting of thin film tungsten contacts for a milliwatt Si-Ge thermopile --- temperature effect on sputter deposited layers
[SLA-73-1087] N75-10471

ELECTRIC CURRENT
Vibration and stability of structures with high electric currents
N75-10309

ELECTRIC DISCHARGES
Results of thermal battery cell testing
[SLA-74-5002] N75-10589

ELECTRIC EQUIPMENT
Ferrite-core transformer bonding and potting
[BDX-613-992] N75-10315

ELECTRIC FIELDS
Vibration and stability of structures with high electric currents
N75-10309
Studies in atmospheric electricity
[TT-74-50008] N75-10623

ELECTRIC GENERATORS
Transistorized impulse generators in the millisecond range --- characteristics of relaxation wideband generators in dipole and field transistors
N75-10306
Standardized wind electric power unit
[AD-783764] N75-10598
Effective utilization of solar energy to produce clean fuel
[PB-233956/2] N75-10605

ELECTRIC MOTORS
Micro-electric motors running on a pulsating current on constant voltage
N75-10308
On the operating characteristics of induction motors fed by thyristor inverters
[SERIAL-150-VOL-24-NO-1] N75-10310
Calculating synchronous inductive reactances of contactless machines when magnetic circuit is saturated and of machines with superconducting excitation windings
[AD-784696] N75-10328
Harmonic components, of the magnetic conductivity of the air gap of electric motors on a gear surface
[AD-783930] N75-10334

ELECTRIC NETWORKS
Algorithms and logical networks
[AD-783426] N75-10727

ELECTRIC POTENTIAL
Effect of rapidly changing voltages on thick-film resistors
[BDX-613-1085-REV] N75-10314
Control of electrostatic damage to solid state devices
[BDX-613-1080] N75-10830

ELECTRIC POWER PLANTS
Standardized wind electric power unit
[AD-783764] N75-10598

ELECTRIC POWER SUPPLIES
Functioning of power rectifiers and thyristors from 1 January 1970 to 31 December 1972 --- noting carrier injection, emitter shorts, ignition, and breakdown
[BMFT-FB-T-74-07] N75-10319
The economics of using wind power for electricity supply in the Netherlands and for water supply on Curacao
[NASA-TT-F-15982] N75-10587
Evaluation of coal conversion processes to provide clean fuels, part 1 --- coal conversion to clean fuels
[PB-234202/0] N75-10600
Experimental and analytical research on a two megawatt, high performance MHD generator
[AD-783267] N75-10610
Operation of air cathodes in the presence of hydrazine
[AD-783241] N75-10611

ELECTRIC PULSES
Chemical to electromagnetic energy conversion techniques --- explosive flux compression technology
[AD-783901] N75-10609

ELECTRIC TERMINALS
Ultrasonic welding of electrical terminations
[BDX-613-1016] N75-10460

ELECTRIC WIRE
Testing of a flat conductor cable baseboard system for residential and commercial wiring
[NASA-TM-X-64888] N75-10313
The geometrical accuracy of electrical wires and the interference effects on small measuring objects
[FOA-2-C-2539-D4] N75-10415

ELECTRICAL ENGINEERING
Research in solid state, plasmas, electrical and biomedical engineering
[AD-784655] N75-10750

ELECTRICAL GROUNDING
Technology development report: Results of static electricity discharge system tests [active and passive] heavy lift helicopter
[AD-784130] N75-10082

ELECTRICAL PROPERTIES
On the operating characteristics of induction motors fed by thyristor inverters
[SERIAL-150-VOL-24-NO-1] N75-10310
Surface electronic properties and the search for new hydrogen oxidation catalysts --- considering tungsten, platinum, and tungsten carbide
[SLA-73-5805] N75-10833

ELECTRICAL RESISTANCE
Methodology for computation of interface parameters of a hot-wire explosive device from the electrothermal response analog
[SLA-73-1034] N75-10261
Effect of soldering flux on Ta2N resistors
[SLA-73-1045] N75-10317

ELECTRO-OPTICS
Shuttle sortie electro-optical instruments study
[NASA-CR-132457] N75-10406
Large aperture electrooptic photographic shutter
[SLA-74-101] N75-10416
Opto-electronics --- application of electro-optical equipment for avionic systems
[AGARD-LS-71] N75-10774
The impact of opto-electronics upon avionics --- development and application of electro-optical equipment with emphasis on system design
N75-10775
Laser sources --- characteristics of various laser systems and methods for controlling laser outputs
N75-10776
Infrared and visible radiation detectors for imaging and non-imaging applications
N75-10777
Display devices and their use in avionics systems --- factors affecting selection and performance of electro-optical sensors
N75-10778
Optical waveguide data transmission for avionics --- analysis of materials, structures, circuits, and waveguide/terminal interface
N75-10779
Head-up display optics --- application to weapon aiming systems in military aircraft
N75-10780
Optics for passive viewing devices --- characteristics and applications of infrared detectors for image intensification
N75-10781
Principle and realization of aeronautical laser systems --- characteristics and applications of laser systems for military purposes
N75-10782
Low light television systems --- construction, operation, and application of various television systems
N75-10783
Passive infrared systems --- effects of atmosphere on imaging techniques and sensor design
N75-10784
Commutable functional devices of the scanistor type in systems of optoelectronic information processing
[AD-783820] N75-10789
An investigation of electro-optical modulation methods in GaSs epitaxial thin film waveguides at 10.6 micron wavelength
N75-10817
Studies of spin-wave mode-locking and phonon magnon interaction and the potential use of the effects for device applications
[AD-784676] N75-10838

ELECTROACOUSTIC TRANSDUCERS
NTC tracking display
[AD-783961] N75-10760

ELECTROCHEMICAL CORROSION
Fungus and corrosion induced failure mechanisms --- in electronic equipment circuitry
[AD-783361] N75-10479

ELECTROFORMING
Fabrication of liquid-rocket thrust chambers by electroforming
[NASA-TM-X-3116] N75-10172

ELECTROLUMINESCENCE
Electroluminescence of crystals
N75-10822

ELECTROLYTES
Sealed primary lithium-inorganic electrolyte cell
[AD-782819] N75-10607
Sealed lithium inorganic electrolyte cell
[AD-784072] N75-10612

ELECTROLYTIC CELLS
Operation of air cathodes in the presence of hydrazine
[AD-783241] N75-10611

ELECTROMAGNETIC COMPATIBILITY
In-harbor and at-sea electromagnetic compatibility survey for maritime satellite L-band shipboard terminal
[NASA-CR-139131] N75-10284

ELECTROMAGNETIC FIELDS
Physical practicum on electromagnetic fields
N75-10743

ELECTROMAGNETIC PUMPS
Preliminary design of a Primary Loop Pump Assembly [PLPA], using electromagnetic pumps
[NASA-CR-140713] N75-10458

ELECTROMAGNETIC RADIATION
Polarization of radar signals
[AD-783761] N75-10303
Electromagnetic radiation screening of microcircuits for long life applications
[NASA-CR-120512] N75-10311

ELECTROMAGNETIC SPECTRA
Research investigation directed toward extending the useful range of the electromagnetic spectrum --- atomic spectra and electronic structure of alkali metals
[NASA-CR-140678] N75-10272

ELECTRON BEAMS
E-beam HCl laser
[AD-784500] N75-10447

Profile and contamination of an electron beam
[NOTA-INTERNA-542] N75-10766
Acceleration of ions in heavy-current electron beams
[AD-782085] N75-10811
Interim report on Fokker-Planck studies of two-component-tori --- with beam injection and nuclear fusion
[AD-783036] N75-10816

ELECTRON DIFFUSION
Application of the classical theory of electrons in gases to multiwire proportional and drift chambers
[LBL-3013] N75-10828

ELECTRON ENERGY
Electron energy loss spectrometry
[BMFT-FB-T-74-06] N75-10788

ELECTRON IRRADIATION
Effect of electron irradiation on mechanical properties and structure of aluminum
[AD-784321] N75-10242

ELECTRON PROBES
Image enhancement techniques: Electron microprobe experiment
[SLL-73-292] N75-10787

ELECTRON STATES
Hydrogen in metals: A new theoretical model
[SLA-73-5810] N75-10233

ELECTRON TUBES
Protection of glass tubes in epoxy encapsulation
[BDX-613-931-REV] N75-10188

ELECTRON TUNNELING
In-situ transport measurements on UHV grown a-Ge samples
[SLA-73-7074] N75-10834

ELECTRONIC COUNTERMEASURES
T and E guidelines for airborne ECM systems
[AD-784574] N75-10332

ELECTRONIC EQUIPMENT
Radio-electronics and space
[AD-783968] N75-10299
The electronics of the plasma drift experiment S 329 in the GEOS satellite
[MPI-PAE/TB-EXTRATERR-10] N75-10320
Fungus and corrosion induced failure mechanisms -- - in electronic equipment circuitry
[AD-783361] N75-10479

ELECTROPHYSICS
Physical practicum on electromagnetic fields
N75-10743

ELECTROSLAG REFINING
Electroslag remelting
[JPRS-63220] N75-10212
Some characteristics of the thermal operation of an electroslag remelting furnace crystallizer with a broadened slag top
N75-10213
Electroslag remelting during production of sheet steel
N75-10215
Electroslag remelting in multipass crystallizers
N75-10216
Use of electroslag technique in manufacture of cold-rollers
N75-10218
Electroslag smelting of large-size hollow billets
N75-10219
Some characteristics of EShP of metal in consumable crystallizers
N75-10220
Mechanism of formation of corrugations on the surface of electroslag ingots
N75-10221

ELECTROSLAG WELDING
Prospects of manufacturing crankshafts for ship's diesels by the electroslag casting method
N75-10217
Investigating the quality of welded electroslag joints of rotors 1500 MM in diameter of 25[KHN3MF] steel of electroslag and electrofurnace smelting
N75-10222
Using EShP to obtain cast electroslag forging billets
N75-10223

ELECTROSTATIC CHARGE
Control of electrostatic damage to solid state devices
[BDX-613-1080] N75-10830

ELECTROSTATIC PROBES
Imminent engine failure probe investigation --- electrostatic probing of gas turbines
[AD-783823] N75-10098
Conical electrostatic probe response in a weakly ionized gas flow --- for measuring ion density
[AD-783261] N75-10815

ELECTROSTATIC PROPULSION
Parametric investigation of a linear edge colloid thruster
[ESRO-CR[P]-485] N75-10174

ELEVONS
Effect of ELEVON gap configurations on the longitudinal stability and control effectiveness of the 43-0 space shuttle orbiter [OA118]
[NASA-CR-134407] N75-10152

ELLIPTIC FUNCTIONS
Symbolic integration of a class of algebraic functions --- by an algorithmic approach
[NASA-CR-140707] N75-10730

ELLIPTICAL CYLINDERS
Propagation of waves in elliptic ducts. A theoretical study --- in view of jet engine compressor noise reduction
[NASA-CR-140652] N75-10378

ELUTION
Water elution of organic matter in the northern Taiga forests of the Kola Peninsula
[NASA-TT-F-15981] N75-10519

EMISSION SPECTRA
Emission and absorption lines of QSOs and properties of the gas that produces them
N75-10763
Radio recombination line observation of the CII region NGC2023
[AD-783983] N75-10883

ENCAPSULATING
Protection of glass tubes in epoxy encapsulation
[BDX-613-931-REV] N75-10188
Ferrite-core transformer bonding and potting
[BDX-613-992] N75-10315

ENERGY
NSF-Rann energy abstracts: A monthly abstract journal of energy research
[ORNL-EIS-74-52-VOL-2-NO-1] N75-10592

ENERGY CONSUMPTION
Total energy use for commercial aviation in the US
[ORNL-NSF-EP-68] N75-10039
MEGASTAR: The Meaning of Energy Growth: An Assessment of Systems, Technologies, and Requirements
[NASA-CR-120355] N75-10584
US energy flow charts for 1950, 1960, 1970, 1980, 1985, and 1990
[UCRL-51487] N75-10593

ENERGY CONVERSION
Production engineering measure for an Integrated Power Switch [IPS]
[AD-784317] N75-10329
Novel materials for power systems. Part 3: Selective emitters for energy conversion
[AD-784449] N75-10608
Chemical to electromagnetic energy conversion techniques --- explosive flux compression technology
[AD-783901] N75-10609

ENERGY DISSIPATION
Dielectric constants and dissipation factors of simulated lunar rocks
[PB-234053/7] N75-10575
Electron energy loss spectrometry
[BMFT-FB-T-74-06] N75-10788

ENERGY DISTRIBUTION
Energy transportation, distribution, and storage
[WASH-1281-4] N75-10595

ENERGY POLICY
An economic analysis of oil shale operations featuring gas combustion retorting
[BM-TPR-81] N75-10579
Rationale for setting priorities for new energy technology research and development
[UCRL-51511] N75-10594
Development of solar engineering in the USSR
[AD-784708] N75-10597
Preliminary evaluation of underground coal gasification at Hanna, Wyoming
[BM-TPR-82] N75-10599
Impact of motor gasoline lead additive regulations on petroleum refineries and energy resources, 1974-1980, phase 1
[PB-234185/7] N75-10601
Char oil energy development
[PB-233263/3] N75-10603
Evaluation of coal conversion processes to provide clean fuels, part 2
[PB-234203/8] N75-10604
Novel materials for power systems. Part 3: Selective emitters for energy conversion
[AD-784449] N75-10608
Effects of energy crisis on education, 1974
[GPO-27-765] N75-10850
Market performance and competition in the petroleum industry, part 2
[GPO-28-740] N75-10855
National Crude Oil Refinery Development Act, part 2
[GPO-35-578] N75-10860
The National Coal Conversion Act and the National Crude Oil Refinery Development Act
[GPO-28-964] N75-10861
Oil and Gas Energy Tax Act of 1974
[H-REPT-93-1028-PT-2] N75-10866

ENERGY SOURCES
US energy flow charts for 1950, 1960, 1970, 1980, 1985, and 1990
[UCRL-51487] N75-10593
Advanced nuclear research
[GPO-41-253] N75-10764
Elimination of duty on methanol imported for certain uses
[H-REPT-93-998] N75-10857
High Seas Oil Port Act
[H-REPT-93-1042] N75-10858
Public works for water and power development and Atomic Energy Commission Appropriation Bill, 1975. Part 6: Tennessee Valley Authority
[GPO-32-403] N75-10859

ENERGY SPECTRA
The variation of solar proton energy spectra size distribution with heliolongitude
[NASA-TM-X-70770] N75-10899

ENERGY STORAGE
Energy transportation, distribution, and storage
[WASH-1281-4] N75-10595
High Seas Oil Port Act
[H-REPT-93-1042] N75-10858

ENERGY TECHNOLOGY
Rationale for setting priorities for new energy technology research and development
[UCRL-51511] N75-10594

ENERGY TRANSFER
A study of CO2 gasdynamic lasers. Part 1: Theoretical and numerical analysis --- molecular exchange mechanisms
[CP-38] N75-10435
Solar energy absorber
[NASA-CASE-MFS-22743-1] N75-10585

ENGINE DESIGN
HLH/ATC engine shaft support bearing development program
[AD-784593] N75-10097
Dual mode ramjet theoretical and experimental performance for Mach 3.5 to 7 domain of flight velocities
N75-10368
Design procedures for elevated temperature low-cycle fatigue --- as applied to aircraft jet engines
N75-10494

ENGINE FAILURE
Imminent engine failure probe investigation --- electrostatic probing of gas turbines
[AD-783823] N75-10098

ENGINE INLETS
Some icing tests on selected screen samples --- made of wire and the protection of engines
[LTR-ENG-17] N75-10090

ENGINE NOISE
Isolated rotor noise due to inlet distortion or turbulence
[NASA-CR-2479] N75-10094
Satellite X4: The 100-element self-scanned photodiode array experiment
[RAE-TR-73195] N75-10145
High speed cascade noise
[TT-7406] N75-10736

ENGINE TESTS
Highly loaded multi-stage fan drive turbine: Performance of final three configurations
[NASA-CR-2446] N75-10089
Scale model testing of the jet noise characteristics of the JT8D refan engine nozzle system
[NASA-CR-134618] N75-10091
Integrated thruster assembly program
[NASA-CR-134509] N75-10163
Precision in LCHTF testing --- of aircraft jet engines
N75-10490

ENTRAINMENT
Intermittency, the entrainment problem --- in turbulent wake flows
N75-10342

ENTROPY
The entropic energy of geophysical fluid systems
N75-10343

ENVIRONMENT EFFECTS
Ecological effects and environmental fate of solid rocket exhaust
[NASA-CR-140598] N75-10616
Consideration of probability of bacterial growth for Jovian planets and their satellites
[NASA-CR-140807] N75-10712

ENVIRONMENT POLLUTION
Limit lead in gasoline
[GPO-29-660] N75-10239

ENVIRONMENT PROTECTION
Impact of motor gasoline lead additive regulations on petroleum refineries and energy resources, 1974-1980, phase 1
[PB-234185/7] N75-10601
National Environmental Policy Act of 1969. Environmental indices, status of development pursuant to Sections 102[2][B] and 204 of the act
[GPO-25-314] N75-10617
Public works for water and power development and Atomic Energy Commission Appropriation Bill, 1975. Part 6: Tennessee Valley Authority
[GPO-32-403] N75-10859

ENVIRONMENTAL CONTROL
Environmental control system transducer development study --- for space shuttles
[NASA-CR-140312] N75-10409
Modern trends in environmental testing
[SLA-73-5931] N75-10449
Three suggested methods of controlling air pollution in the US and their probable economic impact on the domestic coal industry
N75-10614

ENVIRONMENTAL MONITORING
Modern trends in environmental testing
[SLA-73-5931] N75-10469
Environmental surveys in Alaska based upon ERTS data
N75-10551
ERTS program of the US Army Corps of Engineers --- water resources
N75-10554
Remote sensing applications in marine science programs at VIMS
[NASA-CR-137475] N75-10566
A survey for the use of remote sensing in the Chesapeake Bay region
[NASA-CR-137476] N75-10571
National Environmental Policy Act of 1969. Environmental indices, status of development pursuant to Sections 102[2][B] and 204 of the act
[GPO-25-314] N75-10617
ENVIRONMENTAL QUALITY
Studies of pollutant concentration frequency distributions --- statistical techniques for air quality control
N75-10613
EPOXY COMPOUNDS
Laboratory development and tensile testing of graphite/glass/epoxy hybrid composite materials
[AD-783860] N75-10190
Response of boron-epoxy composite to impact loading
[AD-784600] N75-10191
Tensile properties of an ultrahigh-strength graphite fiber in an epoxy matrix
[UCRL-75209] N75-10253
EPOXY RESINS
Protection of glass tubes in epoxy encapsulation
[BDX-613-931-REV] N75-10188
EQUATIONS
One-dimensional equations for MHD channel flows
N75-10365
EQUATIONS OF STATE
Correlation of thermodynamic properties of fluids through generalized hard sphere-augmented equation of state
N75-10843
EQUILIBRIUM EQUATIONS
On the non-existence of adjacent equilibrium states at bifurcation points
[AD-783336] N75-10510
EQUIPMENT SPECIFICATIONS
The electronics of the plasma drift experiment S 329 in the GEOS satellite
[MPI-PAE/TB-EXTRATERR-10] N75-10320
EROSION
The influence of aerodynamic parameters on the rate of erosion rate caused by the impact of a liquid droplet at the stagnation point of a body flying at supersonic speed
[ESRO-TT-86] N75-10374
Parameters governing the erosion resistance of coating substrate systems
[AD-784496] N75-10467
ERROR ANALYSIS
Certain systematic errors arising in the photometry of planetary discs
[NASA-TT-F-15999] N75-10405
Statistical estimation of the light pulse deformation in the optical sounding of plane-stratified clouds
[AD-784245] N75-10654
ERROR FUNCTIONS
A method for determining the error of a laser gyroscope when measuring the turning angle of a moving base
[AD-783970] N75-10427
ESRO SATELLITES
A study on data-compression techniques
[ESRO-CR-93] N75-10717
ESTIMATING
Estimation of the characteristics of various flare profiles
[ESRO-TT-89] N75-10031
ESTUARIES
A study of lagoonal and estuarine processes in the area of Merritt Island encompassing the space center
[NASA-CR-140601] N75-10670
ETCHANTS
Evaluation of pre-bond etchants in hybrid microcircuit processing
[SLA-73-1049] N75-10316
EUROPEAN SPACE PROGRAMS
Activities of the European Space Tribology Laboratory --- thermal vacuum test facilities
[ESRO-ESTL-5] N75-10462
An investigation of the experience and implications of using non Hi-Rel components in European scientific experiments. Volume 1: Summary
[GT-7310-VOL-1] N75-10476
An investigation of the experience and implications of using non Hi-Rel components in European scientific experiments. Volume 2: Main report
[GT-7310-VOL-2] N75-10477
EXCITATION
Determination of the dynamic characteristics of a structure from a vibration test performed with only one excitation point --- exemplified for aircraft structures
N75-10371
EXCITONS
Network models of crystals
[AD-784516] N75-10835
EXHAUST GASES
Ecological effects and environmental fate of solid rocket exhaust
[NASA-CR-140598] N75-10616
New motor vehicle emission standards and fuel economy
[GPO-29-272] N75-10863
EXOBIOLOGY
Aerospace medicine and biology: A continuing bibliography with indexes, supplement 132
[NASA-SP-7011[132]] N75-10684
EXPERIMENTAL DESIGN
Apollo 17 ultraviolet spectrometer experiment [S-169]
[NASA-CR-140316] N75-10128
Mariner Mars 1971 television picture catalog. Volume 1, addendum 1: Experiment design and picture data
[NASA-CR-140700] N75-10890
EXPLODING WIRES
Methodology for computation of interface parameters of a hot-wire explosive device from the electrothermal response analog
[SLA-73-1034] N75-10261
EXPLORER SATELLITES
Evaluation program for secondary spacecraft cells: Initial evaluation tests of General Electric Company 12.0 ampere-hour, nickel-cadmium spacecraft cells for the international ultraviolet Explorer satellite
[NASA-CR-140672] N75-10583
EXPLORER 27 SATELLITE
Observation equations for resonance parameters of the 13th Order from the orbit analysis of GEOS B, BE-C, and D1D satellites
[SER-C/DISS-198] N75-10132
EXTERNALLY BLOWN FLAPS
Analysis of a flare-director concept for an externally blown flap STOL aircraft
[NASA-TN-D-7760] N75-10061
EXTRATERRESTRIAL RADIO WAVES
Radio recombination line observation of the CII region NGC2023
[AD-783983] N75-10883

F

F-4 AIRCRAFT
High acceleration cockpits for advanced fighter aircraft. Volume 1: Program summary --- human factors engineering for optimal design
[AD-783600] N75-10064
F-5 AIRCRAFT
Transonic buffet behavior of Northrop F-5A aircraft
[NASA-CR-140939] N75-10054
F-8 AIRCRAFT
Extraction from flight data of lateral aerodynamic coefficients for F-8 aircraft with supercritical wing
[NASA-TN-D-7749] N75-10006
FAILURE ANALYSIS
Parameters governing the erosion resistance of coating substrate systems
[AD-784496] N75-10467
FAILURE MODES
Development of accelerated life testing techniques for general failure modes of aircraft hardware
[AD-784188] N75-10073
Fungus and corrosion induced failure mechanisms --- in electronic equipment circuitry
[AD-783361] N75-10479
FAR FIELDS
Acoustic scattering from a sphere with nonuniform surface impedance --- mathematical method for computing overpressure in near and far fields
[AD-783805] N75-10757
FARADAY EFFECT
Optical and Faraday studies of liquid crystals
N75-10825
FATIGUE [MATERIALS]
Multiaxial fatigue. Present and future methods of correlation
N75-10492
The collection, generation, and analysis of MIL-HDBK-5 allowable design data --- fatigue data for aluminum alloys, titanium alloys, and steels
[AD-783616] N75-10506
FATIGUE LIFE
Lifetime prediction methods for elevated temperature fatigue --- in aircraft jet engines
N75-10493
Fatigue endurance, crack sensitivity and nucleation characteristics of structural elements in four aluminium-copper alloys
[ARC-CP-1259] N75-10503
Significance of cyclic history dependent deformation phenomena of metals on fatigue life estimation
[AD-784297] N75-10507
The effects of welding and various postweld treatments on the low-cycle fatigue behavior of 5086-H116 and 5456-H117 aluminum alloys
[AD-784392] N75-10509
FATIGUE TESTS
Hydrogen brittleness in hydrogen and hydrogen-oxygen gas mixtures
[COO-2[illegible]] N75-10231
Reduction of errors in ceramic bend tests --- stress concentration and displacement
[AD-784435] N75-10256
FATS
Effect of stress on fat metabolism in connection with fat contents of emergency rations
[R-4255] N75-10680
FEDERAL BUDGETS
Public works for water and power development and Atomic Energy Commission Appropriation Bill, 1975. Part 6: Tennessee Valley Authority
[GPO-32-403] N75-10859
FEED SYSTEMS
Dual S and Ku-band tracking feed for a TDRS reflector antenna
[NASA-CR-139122] N75-10312
FEEDBACK
Investigation of rank 2 and higher output feedback for pole placement
[NASA-TM-X-62385] N75-10741
FEEDBACK CONTROL
Some aspects of optical feedback with cadmium sulfide and related photoconductors --- for extended frequency response
[NASA-TN-D-7727] N75-10785
FEMALES
In vivo measurement of human body composition
[NASA-CR-140668] N75-10690
FERRITES
Apparatus for measuring the ferrite content of austenitic stainless steel weld material
[NASA-CASE-MFS-22907-1] N75-10210
Ferrite-core transformer bonding and potting
[BDX-613-992] N75-10315
FERROMAGNETISM
Conduction electrons and magnetism
[AD-783401] N75-10839
FERROUS METALS
The effect of the titanium content on the active corrosion of ferritic r-steels and austenitic Cr-Ni-steels in sulfuric acid
[NASA-TT-F-15994] N75-10211
FIBER OPTICS
Opto-electronics --- application of electro-optical equipment for avionic systems
[AGARD-LS-71] N75-10774
FIBER STRENGTH
Development of high temperature materials for solid propellant rocket nozzle applications --- tantalum carbides-tungsten fiber composites
[NASA-CR-140666] N75-10165
FIELD EFFECT TRANSISTORS
Transistorized impulse generators in the millisecond range --- characteristics of relaxation wideband generators in dipole and field transistors
N75-10306
Technology of integration of junction field effect transistors
[BMFT-FB-T-74-11] N75-10322
FINANCIAL MANAGEMENT
Third annual report on the financial condition and results of the operation of the Airport and Airway Trust Fund
[H-DOC-93-230] N75-10854
FINE STRUCTURE
Fine structure precipitation effects and possible remedial techniques on 15 GHz line-of-sight radio links
[AD-784096] N75-10305
FINITE DIFFERENCE THEORY
Two dimensional analysis of fluid-structure interaction by method of finite differences: hydraulic ram, the fuel tank problem
[AD-783839] N75-10068
A shock capturing method for calculating supersonic flow fields
[ARC-CP-1290] N75-10381
FINITE ELEMENT METHOD
Nonlinear finite-element formulation for transient analysis of three-dimensional thin structures
[ANL-8104] N75-10486
Recent advances in numerical weather prediction
[AD-784364] N75-10664
Empirical investigation of reordering and data management for finite element systems of equations
[ANL-8056] N75-10732
FIRE PREVENTION
Station set requirements document. Volume 82: Fire support. Book 2: Preliminary functional fire plan
[NASA-TM-X-72032] N75-10105
Fire detection: The state-of-the-art --- a description of instruments for detecting outputs of the combustion process
[NASA-CR-140653] N75-10404
FISHES
A review of initial investigations to utilize ERTS-1 data in determining the availability and distribution of

living marine resources --- harvest and management of fisheries resources in Mississippi Sound and Gulf waters
N75-10555
The Coho Project: Living resources prediction feasibility study, volume 1 --- meteorological forecasting of fish concentrations
[PB-234057/8] N75-10681
The Coho Project: Living resources prediction feasibility study. Volume 2: Environmental report
[PB-234058/6] N75-10682
The Coho Project: Living resources prediction feasibility study. Volume 3: System evaluation report
[PB-234059/4] N75-10683

FLAME PROPAGATION
Laser-interaction studies. Part 1: A theoretical investigation of laser supported combustion waves. Part 2: Measurements of the effect of particulate, matter on air breakdown by 1.06 micron
[AD-784356] N75-10436

FLAME TEMPERATURE
Mechanical deburring of plastics
[BDX-613-988-REV] N75-10270

FLAMES
Application of multispectral color photography to flame flow visualization
[DLR-MITT-74-23] N75-10420

FLARES
Atmospheric properties and their effect on target acquisition under flare illumination
[AD-783052] N75-10665

FLASH LAMPS
Optimal light characteristics for battery operated navigation lights --- surface navigation beacons
[IZF-1974-8] N75-10044

FLAT CONDUCTORS
Testing of a flat conductor cable baseboard system for residential and commercial wiring
[NASA-TM-X-64888] N75-10313

FLAT PLATES
Scattering of background molecules in free jet expansions studied by free molecular flat plate drag measurements
[DLR-FB-74-16] N75-10379
Development of insulation transfer-standards using a flat plate calorimeter
[NASA-CR-140710] N75-10403

FLAT SURFACES
The hydrodynamic impact of a falling body upon a viscous incompressible fluid
N75-10341

FLIGHT CHARACTERISTICS
Critical review of methods to predict the buffet capability of aircraft
[AGARD-R-623] N75-10053
Optimum rate of climb for high performance aircraft
[AD-784112] N75-10076
Yaw axis stability augmentation system flight test report --- flight tests of H-58 helicopter
[AD-784134] N75-10083
Effects of ground-based aircraft simulator motion conditions upon prediction of pilot proficiency, part 1
[AD-783256] N75-10112
ERTS 1 flight evaluation report, 23 October 1973 - 23 January 1974 --- orbits 6371 to 7651
[NASA-CR-140712] N75-10546
ERTS 1 flight evaluation report, 23 January - 23 April 1974 --- orbits 7652 to 8907
[NASA-CR-140810] N75-10547
ERTS 1 flight evaluation report, 23 April 1974 23 July 1974 --- orbits 8908 to 10182
[NASA-CR-140711] N75-10568

FLIGHT CONTROL
Yaw axis stability augmentation system flight test report --- flight tests of H-58 helicopter
[AD-784134] N75-10083

FLIGHT HAZARDS
Annual review of aircraft accident data: US General Aviation calendar year 1971
[NTSB-ARG-74-2] N75-10037

FLIGHT MECHANICS
Saturn 1B launch vehicle flight evaluation report SA-208 [Skylab-4]
[NASA-TM-X-72019] N75-10140

FLIGHT PATHS
Estimation of the characteristics of various flare profiles
[ESRO-TT-89] N75-10031
Optimum rate of climb for high performance aircraft
[AD-784112] N75-10076
Yaw axis stability augmentation system flight test report --- flight tests of H-58 helicopter
[AD-784134] N75-10083

FLIGHT PLANS
A methodology for determining the flight system mix of an air transfer route structure --- modeling for aircraft operation profitability
N75-10033

FLIGHT SIMULATION
Effects of ground based aircraft simulator motion conditions upon prediction of pilot proficiency, part 2
[AD-783257] N75-10115
Performance monitor system functional simulator, environmental data, orbiter 101 [HFT]
[NASA-TM-X-72028] N75-10136

FLIGHT SIMULATORS
Hybrid electrohydraulic stick-force simulator
[RAE-LIB-TRANS-1751] N75-10110

FLIGHT TESTS
Results of a series of wind tunnel tests on the victor B.Mk.2 aircraft and a comparison with drag estimates and full scale flight data
[ARC-CP-1283] N75-10026
Transonic buffet behavior of Northrop F-5A aircraft
[NASA-CR-140939] N75-10054
Flight tests of Viking parachute system in three Mach number regimes. 1: Vehicle description, test operations, and performance
[NASA-TN-D-7692] N75-10147
A technique for displaying flight information in the field of view of binoculars for use by the pilots of radio controlled models
[NASA-TM-X-72015] N75-10786

FLINT
Comparisons of fracture mirrors in flint glass fractured under various loading conditions
[AD-784489] N75-10258

FLOODS
Geographic applications of ERTS-1 imagery to landscape change --- Mississippi River and Great Smoky Mountains of Tennessee and North Carolina
[E74-10810] N75-10537

FLORIDA
Remote sensing of ocean current boundary layer --- Florida
[E74-10801] N75-10529
Surface water modeling Everglades Water Basin, Florida
[E74-10814] N75-10540
A study of lagoonal and estuarine processes in the area of Merritt Island encompassing the space center
[NASA-CR-140601] N75-10670

FLOW CHARACTERISTICS
Flow tracing fidelity of scattering aerosol in laser Doppler velocimetry
[NASA-CR-140671] N75-10357
Self-excited superturbulence: The whistler nozzle
[RE-488] N75-10363
Two-dimensional flow inside MHD ducts with transverse asymmetries
N75-10364
Calculation of the plane supersonic flow through cascades using the method of analytical characteristics
[ESRO-TT-78] N75-10383

FLOW CHARTS
US energy flow charts for 1950, 1960, 1970, 1980, 1985, and 1990
[UCRL-51487] N75-10593

FLOW COEFFICIENTS
Experimental determination of the pressure recovery coefficients in conical diffusors at large subsonic velocities under various inlet conditions
[NASA-TT-F-15991] N75-10354

FLOW DISTORTION
A rational basis for circumferential distortion index formulation
[AD-783819] N75-10394

FLOW DISTRIBUTION
A parametric study of effect of forebody shape on flow angularity at Mach 8 --- for hypersonic aircraft
[NASA-TN-D-7768] N75-10008
Erosion in radial inflow turbines. Volume 3: Trajectories of erosive particles in radial inflow turbines
[NASA-CR-134700] N75-10087
A rational basis for circumferential distortion index formulation
[AD-783819] N75-10394

FLOW EQUATIONS
Analog simulation of the small perturbation equation applied to transonic flows --- and wall and cascade flows
N75-10370

FLOW MEASUREMENT
Comparative measurements behind a compressor rotor with a space-bound and corotating cylindrical probes
[NASA-TT-F-15833] N75-10352
Measurements of turbulent boundary layer growth over a longitudinally curved surface
[IC-AERO-74-05] N75-10377

FLOW STABILITY
The stability of parallel flows between plane boundaries of two superposed viscoelastic fluids
N75-10337

FLOW VISUALIZATION
Aerospace Research --- topics on airfoil profiles, flow visualization, ablative materials, microanalysis, and filter analysis
[ESRO-TT-90] N75-10011
Methods of visualizing the leading edge separation bubble and analysis of the results
N75-10013
Vapor screen techniques development at the Ballistic Research Laboratories
[AD-784077] N75-10116
Application of multispectral color photography to flame flow visualization
[DLR-MITT-74-23] N75-10420
Natural convection flow visualization and heat transfer from a horizontal circular disk
[AD-783793] N75-10845

FLOX
About the use of lithium-containing propellants in rocket propulsion units with FLOX as oxidizer. Part 1: Parameter study --- with hydrocarbon binders
[ESRO-TT-87] N75-10263
Calculated liquid phase thermodynamic properties and liquid-vapor equilibria for fluorine-oxygen [FLOX] mixtures
[NASA-CR-140709] N75-10844

FLUCTUATION THEORY
Fluctuation effects in the superconducting transition of rhenium
N75-10823

FLUID AMPLIFIERS
Contamination effects in a laminar proportional amplifier
[AD-782244] N75-10396

FLUID DYNAMICS
The geometrical accuracy of electrical wires and the interference effects on small measuring objects
[FOA-2-C-2539-D4] N75-10415

FLUID FILTERS
Measurement of platelet aggregation in flowing blood with the use of a filter --- filter-loop technique and filtragometer
N75-10699

FLUID FLOW
NAHAMMER: A computer program for analysis of one-dimensional pressure pulse propagation in a closed fluid system
[ANL-8059] N75-10350

FLUIDICS
The entropic energy of geophysical fluid systems
N75-10343
Contamination effects in a laminar proportional amplifier
[AD-782244] N75-10396

FLUIDS
Solar energy trap
[NASA-CASE-MFS-22744-1] N75-10586

FLUORINE
Heat transfer investigations of a regeneratively cooled, 1 kN thrust, fluorine/ammonia engine
[ESRO-TT-93] N75-10173

FLUORSPAR
A semi-delphi exercise on fluorspar and manganese in steelmaking
[NMAB-317] N75-10273

FLUTTER ANALYSIS
Aerospace Research --- topics on airfoil profiles, flow visualization, ablative materials, microanalysis, and filter analysis
[ESRO-TT-90] N75-10011
Analysis of spectral density curves in wind tunnel flutter measurements
N75-10017

FLUX DENSITY
Problems in producing highest energy densities by organic capacitor dielectrics
[BMFT-FB-T-74-10] N75-10321

FOG
Atmospheric measurements program
[AD-784374] N75-10653

FOKKER-PLANCK EQUATION
Interim report on Fokker-Planck studies of two-component-tori --- with beam injection and nuclear fusion
[AD-783036] N75-10816

FOOD INTAKE
Effect of stress on fat metabolism in connection with fat contents of emergency rations
[R-4255] N75-10680

FOREBODIES
A parametric study of effect of forebody shape on flow angularity at Mach 8 --- for hypersonic aircraft
[NASA-TN-D-7768] N75-10008

FORECASTING
Earthquakes
[GPO-28-577] N75-10516

FOREST MANAGEMENT
Agriculture, forestry, range resources
N75-10558

FORESTS
Geographic applications of ERTS-1 imagery to landscape change --- Mississippi River and Great Smoky Mountains of Tennessee and North Carolina
[E74-10810] N75-10537

FORMALDEHYDE
Production of edible carbohydrates from formaldehyde in a spacecraft. pH variations in the calcium hydroxide catalyzed formose reaction
[NASA-CR-140684] N75-10181

FORMATIONS
Geochemistry of liquids, gases, and rocks from the Smackover formation
[PB-233427/4] N75-10525

FORTRAN
Using the OCS complot DP-1 plotter
[NASA-CR-140602] N75-10722

Further work on the integration of closed loops specified only as discrete data points --- using FORTRAN
[RAE-TR-73177] N75-10723
Two FORTRAN contouring routines
[NPL-NAC-47] N75-10724
FOURIER SERIES
Free and forced vibration of rectangular plate with damping and arbitrary boundary conditions
N75-10481
FOURIER TRANSFORMATION
Determination of aerodynamic derivatives using the discrete Fourier transformation of transient oscillations
[DLR-FB-74-17] N75-10018
FRACTURE MECHANICS
Response of boron-epoxy composite to impact loading
[AD-784600] N75-10191
Relationship between microstructure and fracture toughness in D6ac steel
[ARL/MET-NOTE-103] N75-10227
An atomic model of an environmentally-affected crack in BCC iron
[AD-783725] N75-10241
Atomic crack simulation in fracture mechanics
[AD-783724] N75-10243
The interaction between line force arrays and planar cracks
[AD-783704] N75-10244
Mechanical behavior of polycrystalline ceramics: Brittle fracture of SiC-Si3N4 materials
[NASA-CR-134732] N75-10251
Comparisons of fracture mirrors in flint glass fractured under various loading conditions
[AD-784489] N75-10258
Activities of the Solid State Technology Institute
N75-10502
FRACTURE STRENGTH
Relationship between microstructure and fracture toughness in D6ac steel
[ARL/MET-NOTE-103] N75-10227
Investigation on the influence of temperature and specimen geometry on the fracture toughness properties of TiAl6V4
[ESRO-TT-75] N75-10234
Plane strain fracture toughness testing on center-cracked plates under uniform tension --- mild steels and polymethyl methacrylate
[CRIF-MT-91] N75-10500
FRAGMENTATION
Physical and dynamical studies of meteors --- radar observation of fragmentation
[NASA-CR-132534] N75-10891
FREE FLIGHT
The unit Reynolds number effect on boundary layer transition
N75-10340
FREE FLOW
The hydrodynamic impact of a falling body upon a viscous incompressible fluid
N75-10341
Free-stream turbulence effects on the turbulent boundary layer
[ARC-CP-1282] N75-10380
FREE JETS
Scattering of background molecules in free jet expansions studied by free molecular flat plate drag measurements
[DLR-FB-74-16] N75-10379
Drag measurements on plates parallel to the flow, and on discs perpendicular to the flow, in supersonic highly rarefied free jets
[ESRO-TT-91] N75-10386
FREE MOLECULAR FLOW
Scattering of background molecules in free jet expansions studied by free molecular flat plate drag measurements
[DLR-FB-74-16] N75-10379
Drag measurements on plates parallel to the flow, and on discs perpendicular to the flow, in supersonic highly rarefied free jets
[ESRO-TT-91] N75-10386
FREEZING
Preliminary hydrogen freezing studies
[NASA-CR-140605] N75-10266
FREQUENCY DISTRIBUTION
Studies of pollutant concentration frequency distributions --- statistical techniques for air quality control
N75-10613
FREQUENCY MODULATION
FM laboratory measurements on the 12GHz klystron YK 1210 [V42SK]
[ESRO-CR[P]-523] N75-10324
FREQUENCY RESPONSE
Some aspects of optical feedback with cadmium sulfide and related photoconductors --- for extended frequency response
[NASA-TN-D-7727] N75-10785
FREQUENCY SHIFT KEYING
Multipath compensation of a DQPSK communication link
N75-10277
FREQUENCY STANDARDS
Frequency standard stability for Doppler measurements on-board the shuttle
[NASA-TM-X-72030] N75-10156
FUEL CELLS
Operation of air cathodes in the presence of hydrazine
[AD-783241] N75-10611
FUEL CONSUMPTION
Total energy use for commercial aviation in the US
[ORNL-NSF-EP-68] N75-10039
New motor vehicle emission standards and fuel economy
[GPO-29-272] N75-10863
FUEL OILS
Char oil energy development
[PB-233263/3] N75-10603
FUEL SYSTEMS
Centaur feedline dynamics study using power spectral methods --- fundamental mode resonant frequencies of RL-10 oxygen and hydrogen feed lines
[NASA-TM-X-3111] N75-10171
FUEL TANKS
Static stability characteristics of the space shuttle external tank [MSFC model 458] during reentry in the MSFC 14-inch TWT [TA1F]
[NASA-CR-134420] N75-10151
Pressure and heat flux results from the space shuttle/external fuel tank interaction test at Mach numbers 16 and 19
[NASA-CR-134418] N75-10154
FUELS
Technologic and related trends in the mineral industries, 1973
[PB-233997/6] N75-10271
Effective utilization of solar energy to produce clean fuel
[PB-233956/2] N75-10605
FUNCTIONAL ANALYSIS
Implementation of an experimental program to investigate the performance characteristics of OMEGA navigation
[NASA-CR-132516] N75-10041
FUNCTIONAL INTEGRATION
Symbolic integration of a class of algebraic functions --- by an algorithmic approach
[NASA-CR-140707] N75-10730
FUNCTIONS [MATHEMATICS]
Unified approach to quadratically convergent algorithms for constrained function minimization
N75-10729
FUNGI
Fungus and corrosion induced failure mechanisms --- in electronic equipment circuitry
[AD-783361] N75-10479
FURNACES
Some characteristics of the thermal operation of an electroslag remelting furnace crystallizer with a broadened slag top
N75-10213

G

GALACTIC RADIATION
Accretion flows onto galactic X-ray sources
N75-10898
GALAXIES
Absolute spectrophotometry in M31 and M32
[NASA-CR-140683] N75-10879
GALERKIN METHOD
Alternating-direction Galerkin methods for parabolic and hyperbolic problems on rectangular polygons
[LA-5534-MS] N75-10731
GALLIUM ARSENIDE LASERS
GaAs Large Optical Cavity [LOC] laser diode for communications receivers
[AD-784341] N75-10442
GALLIUM ARSENIDES
Thermal oxidation of gallium arsenide phosphide --- applied to semiconductor technology
N75-10179
Gallium arsenide submillimeter photoconductive detection
N75-10820
The 3-5 surface studies
[AD-784206] N75-10840
The III-V surface studies
[AD-784342] N75-10842
GALLIUM PHOSPHIDES
Thermal oxidation of gallium arsenide phosphide --- applied to semiconductor technology
N75-10179
GAMMA RAYS
Data analysis support for UNH gamma ray detector on OSO-7
[NASA-CR-140597] N75-10139
Profile and contamination of an electron beam
[NOTA-INTERNA-542] N75-10766
GAPS
Effect of ELEVON gap configurations on the longitudinal stability and control effectiveness of the 43-0 space shuttle orbiter [OA118]
[NASA-CR-134407] N75-10152
GARP ATLANTIC TROPICAL EXPERIMENT
International operations plan for the GARP Atlantic Tropical Experiment, parts 1, 4, 6 and 7
[GATE-9-PT-1] N75-10633
General background and objectives and reference information on platform status, ship schedules and distribution
N75-10634
Satellite operations plan
N75-10635
Operations support plan
N75-10636
Data coordination plan for the GATE Operations Control Centre [GOCC]
N75-10637
GAS ANALYSIS
Comparability of nine methods for monitoring NO2 in ambient air
[PB-233429/0] N75-10618
GAS DENSITY
Remarks about the influence of density fluctuations in turbulent boundary layers for compressible flow
[NASA-TT-F-15989] N75-10353
GAS DETECTORS
Carbon monoxide monitor --- using real time
[NASA-CASE-MFS-22060-1] N75-10414
GAS DISCHARGES
Laser-interaction studies. Part 1: A theoretical investigation of laser supported combustion waves. Part 2: Measurements of the effect of particulate, matter on air breakdown by 1.06 micron
[AD-784356] N75-10436
Analytical and experimental research on HF chemical lasers
[AD-784590] N75-10444
GAS DYNAMICS
Laser in aerodynamic testing: Local measuring methods --- velocity, concentration and temperature measurement in gas dynamics
[DLR-MITT-74-09] N75-10440
Analysis of chemical lasers. Volume 3: One dimensional laser and mixing program guide
[AD-784533] N75-10451
Analysis of chemical lasers. Volume 4: Method of characteristics laser and mixing program [MOC-LAMP] theory and user's guide
[AD-784534] N75-10452
A numerical study of protostellar formation --- the evolution of gravitationally bound gas clouds from the interstellar medium
N75-10874
GAS EXPANSION
Nitrogen condensation in a sonic orifice expansion flow
[AD-783254] N75-10399
GAS FLOW
Laser in aerodynamic testing: Local measuring methods --- velocity, concentration and temperature measurement in gas dynamics
[DLR-MITT-74-09] N75-10440
Analysis of chemical lasers. Volume 2: Chemical laser flow analyses
[AD-784532] N75-10450
Physiologic testing of the T-43 passenger oxygen mask
[AD-783237] N75-10711
Accretion flows onto galactic X-ray sources
N75-10898
GAS JETS
Skimming of molecular beams from diverging non-equilibrium gas jets
[DLR-FB-74-28] N75-10761
GAS MIXTURES
Report on Project Hydrox 2
[AD-784446] N75-10701
GAS TURBINE ENGINES
Statement of the two-dimensional nonstationary problem of thermal conductivity for a bladed wheel of a gas turbine
[AD-784709] N75-10096
Imminent engine failure probe investigation --- electrostatic probing of gas turbines
[AD-783823] N75-10098
GAS TURBINES
Strengthening of oxidation resistant materials for gas turbine applications --- treatment of silicon ceramics for increased flexural strength and impact resistance
[NASA-CR-134661] N75-10092
Solutions to the direct problem of heat transfer between a cooled turbine blade and gas using the dispersion method
[AD-783927] N75-10099
GAS-SOLID INTERFACES
Influence of gas particles adsorbed on the solid surface and influence of structure on the gas-solid interaction measured by molecular beam scatter
[ESRO-TT-84] N75-10235
A model for gas-surface distribution functions
[RM-591] N75-10829
GASDYNAMIC LASERS
A study of CO2 gasdynamic lasers. Part 1: Theoretical and numerical analysis --- molecular exchange mechanisms
[CP-38] N75-10435

GASES
Summary of the Laser Raman Workshop on the measurement of gas properties
[AD-782562] N75-10390
Application of the classical theory of electrons in gases to multiwire proportional and drift chambers
[LBL-3013] N75-10828
GASOLINE
Limit lead in gasoline
[GPO-29-660] N75-10259
Impact of motor gasoline lead additive regulations on petroleum refineries and energy resources, 1974-1980, phase 1
[PB-234185/7] N75-10601
GEARS
Liquid rocket engine turbopump gears
[NASA-SP-8100] N75-10166
Harmonic components, of the magnetic conductivity of the air gap of electric motors on a gear surface
[AD-783930] N75-10334
Zero torque gear head wrench
[NASA-CASE-NPO-13059-1] N75-10456
GENERAL AVIATION AIRCRAFT
Effects of ground-based aircraft simulator motion conditions upon prediction of pilot proficiency, part 1
[AD-783256] N75-10112
GENETICS
Problems of space biology. Volume 27: Radiobiology and genetics of arabidopsis --- effects of radiation and weightlessness
[NASA-TT-F-15849] N75-10679
GEOCHEMISTRY
Geochemistry of liquids, gases, and rocks from the Smackover formation
[PB-233427/4] N75-10525
GEODESY
Soviet satellite geodesy: Basis and status of Soviet laser geodesy and long-base line interferometry
[AD-781138/3] N75-10524
Interaction of marine geodesy, satellite technology and ocean physics
[NASA-CR-137470] N75-10671
Status and prospects of development of space geodesy
[JPRS-63231] N75-10869
GEODETIC SATELLITES
Geodetic results from ISAGEX data --- for obtaining center of mass coordinates for geodetic camera sites
[NASA-TM-X-70763] N75-10567
Interaction of marine geodesy, satellite technology and ocean physics
[NASA-CR-137470] N75-10671
GEODETIC SURVEYS
Cruise data report. CHAIN 115 leg 2, Southlant expedition --- to survey geophysical parameters
[AD-784421] N75-10641
GEOLOGICAL FAULTS
Orbital geology --- an aid to mineral exploration and mapping the earth's surface
[NASA-TT-F-16000] N75-10887
GEOLOGICAL SURVEYS
Geologic and mineral and water resources investigations in Western Colorado, using Skylab EREP data
[E74-10802] N75-10530
Assessment of ERTS-1 imagery as a tool for regional geological analysis in New York State --- Lake Ontario
[E74-10809] N75-10536
Environmental surveys in Alaska based upon ERTS data
N75-10551
Geologic evaluation and applications of ERTS-1 imagery over Georgia
N75-10552
An evaluation of the suitability of ERTS data for the purposes of petroleum exploration --- Anadarko Basin in Oklahoma and Texas
N75-10553
GEOMAGNETISM
Proposal for an experiment for the ESRO geostationary magnetospheric satellite
N75-10144
Geologic and geomagnetic background noise in two areas of the North Atlantic, phase 1 --- magnetic interference arising from sea floor geology
[AD-783693] N75-10627
GEOMETRY
Profile and contamination of an electron beam
[NOTA-INTERNA-542] N75-10766
GEOPHYSICS
Soviet bloc research in geophysics, astronomy, and space, no. 334
[JPRS-63186] N75-10518
Cruise data report. CHAIN 115 leg 2, Southlant expedition --- to survey geophysical parameters
[AD-784421] N75-10641
GEORGIA
Geologic evaleation and applications of ERTS-1 imagery over Georgia
N75-10552
GEOS SATELLITES [ESRO]
Observation equations for resonance parameters of the 13th Order from the orbit analysis of GEOS B, BE-C, and DID satellites
[SER-C/DISS-198] N75-10132
Proposal for an experiment for the ESRO geostationary magnetospheric satellite
N75-10144
The electronics of the plasma drift experiment S 329 in the GEOS satellite
[MPI-PAE/TB-EXTRATERR-10] N75-10320
GEOS-C SATELLITE
Station coordinates for GEOS-C altimeter calibration and experimentation
[NASA-TM-X-70762] N75-10413
GERMANIUM
High purity germanium-low temperature Hall analyses
[UCRL-74832] N75-10831
In-situ transport measurements on UHV grown a-Ge samples
[SLA-73-7074] N75-10834
GIANT STARS
Observations of lithium dilution and rotational velocity decay in F and G giant stars
N75-10873
GIMBALS
Precision Pointing Control System [PPCS] system design and analysis --- for gimbaled experiment platforms
[NASA-CR-139132] N75-10157
GLACIERS
Evaluate ERTS imagery for mapping and detection of changes of snowcover on land and on glaciers --- Alaska and Washington
[E74-10812] N75-10539
GLASS
Effect of water on the properties of a glass-polyimide laminate --- accelerated hydrolytic aging
[RM-589] N75-10186
Protection of glass tubes in epoxy encapsulation
[BDX-613-931-REV] N75-10188
Novel materials for power systems. Part 2: Investigations of proton semi-conducting glasses
[AD-784448] N75-10257
Comparisons of fracture mirrors in flint glass fractured under various loading conditions
[AD-784489] N75-10258
GLASS FIBERS
Laboratory development and tensile testing of graphite/glass/epoxy hybrid composite materials
[AD-783860] N75-10190
GLIDE PATHS
Automatic flying of curved approach paths: A computer and flight investigation
[RAE-TR-73154] N75-10043
GLIDERS
Slow descent recovery system technology study and data program
[AD-783268] N75-10032
Study of the feasibility of using a sailplane as an instrument platform for the study of wake vortex phenomena
[NASA-CR-140603] N75-10086
GLOBAL ATMOSPHERIC RESEARCH PROGRAM
Modelling for the first GARP global experiment
[GARP-PUBL-14] N75-10639
Report of the meeting on drifting buoys for the first GARP global experiment
[GARP-SPEC-REPT-13] N75-10674
GOLD
Quantitative analysis of the influence of contaminants on thermocompression bonding of gold
[SLA-73-1099] N75-10228
GRADIENTS
Methods of investigation for manual control processes
[FB-15] N75-10738
GRAIN BOUNDARIES
The mobility of coincidence and near coincidence grain boundaries
[AD-782908] N75-10236
Further observations on the effect of grain boundary segregation in the hydrogen embrittlement of nickel
[AD-783103] N75-10248
GRAPHITE
Laboratory development and tensile testing of graphite/glass/epoxy hybrid composite materials
[AD-783860] N75-10190
Tensile properties of an ultrahigh-strength graphite fiber in an epoxy matrix
[UCRL-75209] N75-10253
High-temperature coatings on graphite
[AD-783567] N75-10463
Protective coatings from refractory compounds on metals and graphite
[AD-783923] N75-10466
GRAVITATIONAL EFFECTS
Liquid phase sintered compacts in space
[NASA-CR-120507] N75-10122
A numerical study of protostellar formation --- the evolution of gravitationally bound gas clouds from the interstellar medium
N75-10874
GROUND EFFECT
Ground effect for V/STOL aircraft configurations and its simulation in the wind tunnel. Part 3: The tangentially blown ground as an alternative to a moving ground: Application to the NASA-Ames 40 by 80-foot wind tunnel
[NASA-CR-114497] N75-10005
GROUND EFFECT MACHINES
Optimization of waterjet propulsion systems for surface effect ships
[AD-781916] N75-10464
GROUND STATE
Helium at zero temperature with hard-sphere and other forces
[COO-3077-35] N75-10182
GROUND STATIONS
Earth stations for satellite communications
[REPT-6866] N75-10280
TDRSS data handling and management system study. Ground station systems for data handling and relay satellite control
[NASA-CR-139128] N75-10289
GROUND WATER
Water elution of organic matter in the northern Taiga forests of the Kola Peninsula
[NASA-TT-F-15981] N75-10519
GROUND WIND
Does representative ground wind measurement exist? --- velocity data terrain transformation
[KNMI-V-257] N75-10640
GROWTH
Consideration of probability of bacterial growth for Jovian planets and their satellites
[NASA-CR-140807] N75-10712
GUIDANCE [MOTION]
Conversion of a D17B [Minuteman 1] guidance computer to acquire and process evoked response information
N75-10714
GUIDANCE SENSORS
Translatory shock absorbers for attitude sensors
[NASA-CASE-MFS-22905-1] N75-10407
GULF OF MEXICO
A review of initial investigations to utilize ERTS-1 data in determining the availability and distribution of living marine resources --- harvest and management of fisheries resources in Mississippi Sound and Gulf waters
N75-10535
GUST LOADS
A study of stabilization techniques for small, fixed-wing, remotely piloted aircraft
[AD-784109] N75-10079
GYROCOMPASSES
A practical on-line filter to process gyrocompass data
[AD-783250] N75-10048
GYROSCOPES
A root locus analysis of a seismic isolation control system --- systems analysis of gyro test facility
[AD-783615] N75-10424
A method for determining the error of a laser gyroscope when measuring the turning angle of a moving base
[AD-783970] N75-10427
GYROSCOPIC STABILITY
Dynamic and static balancing gyroscopic equipment
N75-10401

H

H-53 HELICOPTER
Investigation of the effects of blade structural design parameters on helicopter stall boundaries
[AD-784594] N75-10075
HABITATS
Utilization of Skylab [EREP] system for appraising changes in continental migratory bird habitat
[E74-10817] N75-10543
HALL EFFECT
High purity germanium-low temperature Hall analyses
[UCRL-74832] N75-10831
HANDLEY PAGE AIRCRAFT
Results of a series of wind tunnel tests on the victor B.Mk.2 aircraft and a comparison with drag estimates and full scale flight data
[ARC-CP-1283] N75-10026
HARMONIC OSCILLATION
A two-dimensional aerofoil oscillating at low frequencies in high subsonic flow
[ARC-CP-1285] N75-10027
HARMONIC RADIATION
Vehicular variable-parameter METRRA system --- performance of radar system for clutter rejection using third harmonic return of reflected radiation
[AD-782214] N75-10295
HAWAII
Some statistical analyses of Hawaiian rainfall
[PB-233674/1] N75-10636

HEAD-UP DISPLAYS
The impact of opto-electronics upon avionics --- development and application of electro-optical equipment with emphasis on system design
N75-10775
Head-up display optics --- application to weapon aiming systems in military aircraft
N75-10780
HEAT EXCHANGERS
An improved heat exchanger --- suited for low volume flow
[NASA-CASE-MFS-22991-1] N75-10366
HEAT MEASUREMENT
Development of insulation transfer-standards using a flat plate calorimeter
[NASA-CR-140710] N75-10403
HEAT PIPES
Heat pipe manufacturing study
[NASA-CR-139140] N75-10347
HEAT RESISTANT ALLOYS
Heat resistant coatings obtained by chemical deposition from solutions
[AD-783981] N75-10183
HEAT SHIELDING
Heat transfer in high temperature opacified fiber insulation
[SLA-73-5677] N75-10189
HEAT SOURCES
Advanced heat source concepts --- module design for space electric power generation
[MLM-2134] N75-10591
HEAT TRANSFER
Statement of the two-dimensional nonstationary problem of thermal conductivity for a bladed wheel of a gas turbine
[AD-784709] N75-10096
Solutions to the direct problem of heat transfer between a cooled turbine blade and gas using the dispersion method
[AD-783927] N75-10099
Development of an apparatus to measure thermophysical properties of wind tunnel heat transfer models
[NASA-CR-2434] N75-10104
Pressure and heat flux results from the space shuttle/external fuel tank interaction test at Mach numbers 16 and 19
[NASA-CR-134418] N75-10154
Heat transfer investigations of a regeneratively cooled, 1 kN thrust, fluorine/ammonia engine
[ESRO-TT-93] N75-10173
Heat transfer in high temperature opacified fiber insulation
[SLA-73-5677] N75-10189
Heat transport in porous insulations at cryogenic temperatures
N75-10339
Heat transfer characteristics of an impinging jet in a crossflow
N75-10344
A simple method of calculating power-law velocity profile exponents from experimental data --- for boundary layer shape factor
[NASA-TM-X-72000] N75-10356
An improved heat exchanger --- suited for low volume flow
[NASA-CASE-MFS-22991-1] N75-10366
Natural convection flow visualization and heat transfer from a horizontal circular disk
[AD-783793] N75-10845
HEAT TRANSMISSION
Convection effects on Skylab experiments M551, M552, and M553, phase C report --- metal melting, exothermic brazing, and sphere forming under weightless conditions
[NASA-CR-120482] N75-10120
HEAT TREATMENT
Thermal oxidation of gallium arsenide phosphide --- applied to semiconductor technology
N75-10179
Selection of composition and heat treatment of cast magnetic alloys
[AD-783765] N75-10237
High temperature texture strengthening in alpha-titanium
[AD-784213] N75-10240
HEATING
Quantitative analysis of the influence of contaminants on thermocompression bonding of gold
[SLA-73-1099] N75-10228
Technique for testing the tensile strength of thermocompression bonds
[SLA-74-93] N75-10470
Ion heating in a plasma focus
[NASA-TN-D-7765] N75-10798
HEAVY ELEMENTS
Absolute spectrophotometry in M31 and M32
[NASA-CR-140683] N75-10879
HELICOPTER DESIGN
NASA-Langley helicopter tower instrumentation systems
[NASA-CR-132522] N75-10106
HELICOPTER ENGINES
HLH/ATC engine shaft support bearing development program
[AD-784593] N75-10097
HELICOPTER PERFORMANCE
An exploratory flight investigation of helicopter sling-load placements using a closed-circuit television as a pilot aid
[NASA-TN-D-7776] N75-10009
Yaw axis stability augmentation system flight test report --- flight tests of H-58 helicopter
[AD-784134] N75-10083
HELIUM
Helium at zero temperature with hard-sphere and other forces
[COO-3077-35] N75-10182
Orthopositronium annihilation in liquid and solid helium
N75-10762
Emission and absorption lines of QSOs and properties of the gas that produces them
N75-10763
HIGH ALTITUDE
Turbulence studies on a high-altitude sounding aircraft --- studies of convective processes turbulence, and wave propagation in the atmosphere
[NASA-TT-F-16003] N75-10622
High altitude pulmonary edema
[AD-782240] N75-10702
HIGH ENERGY ELECTRONS
Multicharged particle emission in the disintegration of carbon induced by high-energy electrons --- polystyrene foil, plastic detectors
[NOTA-INTERNA-555] N75-10767
HIGH FREQUENCIES
High frequency electromagnetic wave backscattering from radially inhomogeneous dielectric spheres
N75-10742
HIGH PRESSURE
Secondary high pressure standard for the far-infrared spectral region --- considering sodium chloride lattice structure
[COO-3151-37] N75-10832
HIGH STRENGTH ALLOYS
Research on synthesis of high-strength aluminum alloys. Part 2: Control of grain structure during hot working
[AD-783353] N75-10239
HIGH STRENGTH STEELS
Using EShP to obtain cast electroslag forging billets
N75-10223
Hydrogen brittleness in hydrogen and hydrogen-oxygen gas mixtures
[COO-3166-6] N75-10231
HIGH TEMPERATURE
High temperature texture strengthening in alpha-titanium
[AD-784213] N75-10240
Effect of selected impurities on the high temperature mechanical properties of hot-pressed silicon nitride
[AD-783506] N75-10255
High-temperature coatings on graphite
[AD-783567] N75-10463
Low cycle high temperature fatigue --- in aircraft jet engines: conference proceedings
[AGARD-CP-155] N75-10487
Problems of low cycle high temperature fatigue in aircraft jet engines
N75-10488
An overview of high temperature metal fatigue: Aspects covered by the 1973 International Conference on Creep and Fatigue
N75-10489
Precision in LCHTF testing --- of aircraft jet engines
N75-10490
The effect of cycle parameters on high temperature low cycle fatigue --- in aircraft jet engines
N75-10491
Lifetime prediction methods for elevated temperature fatigue --- in aircraft jet engines
N75-10493
Design procedures for elevated temperature low-cycle fatigue --- as applied to aircraft jet engines
N75-10494
HISTOGRAMS
Applied optics research report
[AD-784228] N75-10795
HOLLOW
Electroslag smelting of large-size hollow billets
N75-10219
HOLLOW CATHODES
Low-frequency instabilities and plasma turbulence --- steady state and time dependent characteristics of positive column and hollow cathode discharge
N75-10797
HOLOGRAPHIC INTERFEROMETRY
Holographic study of rock specimens under uniaxial and triaxial loads
[AD-784433] N75-10431
Holographic interferometry developments for dense plasmas
[AD-783511] N75-10813
HOLOGRAPHY
Real time holographic interferometry
[AD-784215] N75-10432
Methods of coherent optics and holography applied to problems in antenna engineering and data processing
[AD-784337] N75-10433
HORIZONTAL FLIGHT
Evaluation of the accuracy of two helicopter rotor theories
[FFA-124] N75-10020
Performance monitor system functional simulator, environmental data, orbiter 101[HFT]
[NASA-TM-X-72028] N75-10136
HORN ANTENNAS
A prototype four-horn cluster IFF antenna
[AD-784395] N75-10327
HOT ELECTRONS
Study on properties of nonisothermal ion accelerator
[AD-782052] N75-10810
HOVERING STABILITY
Some calculations for air resonance of a helicopter with non-articulated rotor blades
[ARC-R/M-3743] N75-10029
HUMAN FACTORS ENGINEERING
High acceleration cockpits for advanced fighter aircraft. Volume 1: Program summary --- human factors engineering for optimal design
[AD-783600] N75-10064
High acceleration cockpits for advanced fighter aircraft. Volume 2: Crew station design/integration --- control and display devices
[AD-783601] N75-10065
High acceleration cockpits for advanced fighter aircraft. Volume 3: Test plan --- static tests and mission profiles
[AD-783602] N75-10066
High acceleration cockpits for advanced fighter aircraft. Volume 4: Test results
[AD-783603] N75-10067
Measurement, evaluation, prediction and improvement of aircraft ride
[AD-783803] N75-10709
HUMAN PERFORMANCE
Investigations on the day-night-differences of physical performance capacity
[DLR-FB-74-29] N75-10697
HUMAN REACTIONS
The problem of human statokinetic stability in aviation and space medicine
[NASA-TT-F-15933] N75-10687
The dependence of reaction times on the location of the stimulus
[NASA-TT-F-16001] N75-10689
Statokinetic reactions of man under conditions of short term weightlessness
[AD-784142] N75-10705
Models of subjective response to in-flight motion data
[NASA-CR-140675] N75-10708
A survey of aircraft noise annoyance in an area of invariant noise to eliminate the effects on annoyance of varying noise exposure
[TT-7405] N75-10755
HUMAN RESOURCES
Three models for scheduling space shuttle missions and resources
[NASA-CR-140319] N75-10127
HUMAN TOLERANCES
Cold: Physiology, protection and survival
[AGARD-AG-194] N75-10706
HYBRID CIRCUITS
Evaluation of pre-bond etchants in hybrid microcircuit processing
[SLA-73-1049] N75-10316
Effect of soldering flux on Ta2N resistors
[SLA-73-1045] N75-10317
HYBRID COMPUTERS
Real-time simulation of the TF30-P-3 turbofan engine using a hybrid computer
[NASA-TM-X-3106] N75-10095
Hybrid electrohydraulic stick-force simulator
[RAE-LIB-TRANS-1751] N75-10110
HYBRID PROPELLANT ROCKET ENGINES
About the use of lithium-containing propellants in rocket propulsion units with FLOX as oxidizer. Part 1: Parameter study --- with hydrocarbon binders
[ESRO-TT-87] N75-10263
HYBRID PROPELLANTS
Theoretical performance of organic polymers in hybrid engines with hydrogen peroxide as oxidizer --- rocket propellant performance
[ESRO-TT-94] N75-10262
HYDRAULIC ANALOGIES
Hydraulic model study of surface and subsurface wind-driven currents in Lake Ontario
N75-10515
HYDRAULIC CONTROL
Hybrid electrohydraulic stick-force simulator
[RAE-LIB-TRANS-1751] N75-10110
HYDRAULIC JETS
Optimization of waterjet propulsion systems for surface effect ships
[AD-781916] N75-10464

HYDROCARBON FUELS
High Seas Oil Port Act
[H-REPT-93-1042] N75-10858
HYDRODYNAMICS
Experimental determination of hydrodynamic mass effects
[AD-781910] N75-10389
HYDROFLUORIC ACID
Analytical and experimental research on HF chemical lasers
[AD-784590] N75-10444
HYDROGEN
Experimental measurement of internal characteristics of spectral lines using the Roschdestvenskii hook method
[AD-783614] N75-10184
Report on Project Hydrox 2
[AD-784446] N75-10701
Emission and absorption lines of QSOs and properties of the gas that produces them
N75-10763
Surface electronic properties and the search for new hydrogen oxidation catalysts --- considering tungsten, platinum, and tungsten carbide
[SLA-73-5805] N75-10833
Simulation of redshifts in hydrogen by perturbations
[AD-783776] N75-10881
HYDROGEN CHLORIDES
H2-Cl2 chemical laser program. Part 3: Additional arc jet laser experiments
[AD-782871] N75-10446
HYDROGEN COMPOUNDS
Analytical investigation of the effects of rotational relaxation in a C. W., HF chemical laser
[AD-784589] N75-10448
HYDROGEN EMBRITTLEMENT
An atomic model of an environmentally-affected crack in BCC iron
[AD-783725] N75-10241
Further observations on the effect of grain boundary segregation in the hydrogen embrittlement of nickel
[AD-783103] N75-10248
HYDROGEN FUELS
Preliminary hydrogen freezing studies
[NASA-CR-140605] N75-10266
HYDROGEN PEROXIDE
Theoretical performance of organic polymers in hybrid engines with hydrogen peroxide as oxidizer --- rocket propellant performance
[ESRO-TT-94] N75-10262
HYDROGEN RECOMBINATIONS
Hydrogen in metals: A new theoretical model
[SLA-73-5810] N75-10233
HYDROLOGY
Water resources --- monitoring and management from ERTS-1 data
N75-10559
HYDROLYSIS
Effect of water on the properties of a glass-polyimide laminate --- accelerated hydrolytic aging
[RM-589] N75-10186
HYDROMETEOROLOGY
Automation of the hydrometeorological service
[AD-782822] N75-10642
HYPERBOLIC FUNCTIONS
Tabulated values of combinations of cyclic and hyperbolic functions
N75-10052
HYPERSONIC AIRCRAFT
A parametric study of effect of forebody shape on flow angularity at Mach 8 --- for hypersonic aircraft
[NASA-TN-D-7768] N75-10008
HYPERSONIC SPEED
An inlet analysis for the NASA hypersonic research engine aerothermodynamic integration model
[NASA-TM-X-3038] N75-10348
HYPERSONIC VEHICLES
Dual mode ramjet theoretical and experimental performance for Mach 3.5 to 7 domain of flight velocities
N75-10368
HYPERVELOCITY WIND TUNNELS
Results of an investigation of hypersonic viscous interaction effects on an 0.01 scale space shuttle orbiter 51-0 model in the AEDC-VKE hypervelocity wind tunnel
[NASA-CR-134423] N75-10360
HYPOXIA
Alterations of color sensation under hypoxic conditions
[NASA-TT-F-15879] N75-10686

I

ICE FORMATION
Some icing tests on selected screen samples --- made of wire and the protection of engines
[LTR-ENG-17] N75-10090
IGNEOUS ROCKS
Thermal diffusivity of six igneous rocks at elevated temperatures and reduced pressures
[NASA-CR-140577] N75-10562
IGNITION
Study of preignition processes in zirconium, titanium, and zirconium hydride
[AD-783965] N75-10198
IGNITION LIMITS
The ignition limit of a conglomerate of metal particles
[AD-782073] N75-10197
IMAGE CONVERTERS
Development and astronomical application of a high quantum efficiency infrared upconverter
[NASA-CR-140679] N75-10791
IMAGE ENHANCEMENT
Image enhancement techniques: Electron microprobe experiment
[SLL-73-292] N75-10787
Applied optics research report
[AD-784228] N75-10795
Application of digital computer techniques to rectification and enhancement of astronomical images
[NASA-CR-140701] N75-10878
IMAGE INTENSIFIERS
Optics for passive viewing devices --- characteristics and applications of infrared detectors for image intensification
N75-10781
Low light television systems --- construction, operation, and application of various television systems
N75-10783
IMAGING TECHNIQUES
Methods of coherent optics and holography applied to problems in antenna engineering and data processing
[AD-784337] N75-10433
The application of remote sensing techniques: Technical and methodological issues
[NASA-CR-140674] N75-10564
Underwater applications of acousto-optical imaging
[AD-784419] N75-10759
Infrared and visible radiation detectors for imaging and non-imaging applications
N75-10777
Display devices and their use in avionics systems --- factors affecting selection and performance of electro-optical sensors
N75-10778
Optics for passive viewing devices --- characteristics and applications of infrared detectors for image intensification
N75-10781
Low light television systems --- construction, operation, and application of various television systems
N75-10783
Passive infrared systems --- effects of atmosphere on imaging techniques and sensor design
N75-10784
IMPACT
Loss of stability of a cylindrical shell on longitudinal impact
[AD-783570] N75-10505
IMPACT DAMAGE
The influence of aerodynamic parameters on the rate of erosion rate caused by the impact of a liquid droplet at the stagnation point of a body flying at supersonic speed
[ESRO-TT-86] N75-10374
IMPACT LOADS
Response of boron-epoxy composite to impact loading
[AD-784600] N75-10191
The hydrodynamic impact of a falling body upon a viscous incompressible fluid
N75-10341
Response of a finite cylindrical shell to a cosine impulse over half its circumference
[SLA-73-5827] N75-10499
IMPACT RESISTANCE
Strengthening of oxidation resistant materials for gas turbine applications --- treatment of silicon ceramics for increased flexural strength and impact resistance
[NASA-CR-134661] N75-10092
IMPACT TESTS
Elastic pitch beam tail rotor operational suitability investigation
[AD-784595] N75-10069
Photo-optical instrumentation of flyer plate tests
[SLL-72-105] N75-10417
IMPELLERS
Shrouded impeller test program
[AD-784133] N75-10100
IMPURITIES
The effects of impurities and magnetic divertors on high-temperature tokamaks
[MATT-1079] N75-10804
IN-FLIGHT MONITORING
Real-time measuring procedure and measuring equipment for recording the radiation patterns of aircraft antennas in flight
[ESRO-TT-74] N75-10292
T and E guidelines for airborne ECM systems
[AD-784574] N75-10332
INCINERATORS
Integrated pneumatic transporter-incinerator-afterburner subsystem development --- for spacecraft waste disposal
[NASA-CR-140686] N75-10457
INCOMPRESSIBLE BOUNDARY LAYER
A multi-parameter integral method for the calculation of incompressible laminar and temperature boundary layers
[ESRO-TT-88] N75-10385
INCOMPRESSIBLE FLOW
The prediction of turbulent confined jet mixing with and without swirl
N75-10345
A viscous/potential flow interaction analysis method for multi-element infinite swept wings, volume 1
[NASA-CR-2476] N75-10358
A study of the effect of pressure gradient on the eddy viscosity and mixing length for incompressible equilibrium turbulent boundary layers
[AD-783942] N75-10392
Analytical procedures used to obtain and evaluate the eddy viscosity and mixing length extracted from incompressible turbulent boundary layer data
[AD-784416] N75-10397
INCOMPRESSIBLE FLUIDS
The hydrodynamic impact of a falling body upon a viscous incompressible fluid
N75-10341
INDEPENDENT VARIABLES
On changes of variables in kinetic theory
[TRITA-EPP-74-11] N75-10806
INDEXES [RATIOS]
National Environmental Policy Act of 1969. Environmental indices, status of development pursuant to Sections 102[2][B] and 204 of the act
[GPO-25-314] N75-10617
INDICATING INSTRUMENTS
Fire detection: The state-of-the-art --- a description of instruments for detecting outputs of the combustion process
[NASA-CR-140653] N75-10404
INDIUM COMPOUNDS
The III-V surface studies
[AD-784342] N75-10842
INDUSTRIAL ENERGY
The National Coal Conversion Act and the National Crude Oil Refinery Development Act
[GPO-28-964] N75-10861
INDUSTRIAL PLANTS
Recycling of plastics from urban and industrial refuse
[BM-RI-7955] N75-10267
INDUSTRIES
Technologic and related trends in the mineral industries, 1973
[PB-233997/6] N75-10271
Economic impact of the oil shale industry in western Colorado
[GPO-28-608] N75-10588
INELASTIC SCATTERING
Temperature dependence of the magnetic excitations in iron and nickel
N75-10205
INERTIAL GUIDANCE
A root locus analysis of a seismic isolation control system --- systems analysis of gyro test facility
[AD-783615] N75-10424
INERTIAL REFERENCE SYSTEMS
Mariner Mars 1971 attitude control subsystem
[NASA-CR-140706] N75-10168
INFECTIOUS DISEASES
Oral and respiratory immunization
[MBL-1974-4] N75-10698
INFINITE SPAN WINGS
A calculation method for the turbulent boundary layer on an infinite yawed wing in compressible, adiabatic flow
[ARC-CP-1268] N75-10024
A viscous/potential flow interaction analysis method for multi-element infinite swept wings, volume 1
[NASA-CR-2476] N75-10358
INFORMATION FLOW
The attainable goal in airline safety
N75-10035
INFORMATION MANAGEMENT
TDRSS data handling and management system study. Ground station systems for data handling and relay satellite control
[NASA-CR-139128] N75-10289
INFORMATION SYSTEMS
A conceptaul definition study for a digital avionics information system [approach 2], volume 1
[AD-780581/5] N75-10071
A conceptual definition study for a digital avionics information system [approach 2]. Volume 2: Appendixes A thru D
[AD-780582/3] N75-10072
Service C weather schedules
[FAA-7330.7I] N75-10630
Implementation of a mini-computer based information system. Part 1: System overview
[DSIS-TN-16-PT-1] N75-10725

Commutable functional devices of the scanistor type in systems of optoelectronic information processing
[AD-783820] N75-10789

INFRARED DETECTORS
Display devices and their use in avionics systems --- factors affecting selection and performance of electro-optical sensors
N75-10778
Optics for passive viewing devices --- characteristics and applications of infrared detectors for image intensification
N75-10781
Passive infrared systems --- effects of atmosphere on imaging techniques and sensor design
N75-10784
Development and astronomical application of a high quantum efficiency infrared upconverter
[NASA-CR-140679] N75-10791

INFRARED FILTERS
Infrared filters --- spectral and structural characteristics
[NASA-TT-F-814] N75-10744

INFRARED INTERFEROMETERS
High angular resolution and position determinations by infrared interferometry
[NASA-CR-140670] N75-10877

INFRARED LASERS
E-beam HCl laser
[AD-784500] N75-10447
Lasers in chemistry
[AD-783049] N75-10454
Opto-electronics --- application of electro-optical equipment for avionic systems
[AGARD-LS-71] N75-10774

INFRARED RADIATION
Shock-tube studies of vibrational equilibration in carbon dioxide by simultaneous laser absorption and infrared-emission measurements
N75-10346
Lasers in chemistry
[AD-783049] N75-10454
Infrared filters --- spectral and structural characteristics
[NASA-TT-F-814] N75-10744
Infrared, radio, and X-ray observations of Cygnus X-3
[NASA-CR-140680] N75-10882

INFRARED RADIOMETERS
ESRO Nimra conversion study --- conversion of IR radiometers to spacelab compatible experiments to measure atmospheric gas distribution
[HSD-TP-7472] N75-10133

INFRARED SPECTRA
Infrared water vapor and temperature profiler
[AD-783984] N75-10661
Infrared filters --- spectral and structural characteristics
[NASA-TT-F-814] N75-10744

INFRARED SPECTROSCOPY
Study to define behavior of liquid lubricants in an elastohydrodynamic contact
[NASA-CR-134671] N75-10455
Secondary high pressure standard for the far-infrared spectral region --- considering sodium chloride lattice structure
[COO-3151-37] N75-10832

INGOTS
Indirect determination of specific heat fluxes in the crystallizer wall during EShP
N75-10214
Electroslag remelting in multipass crystallizers
N75-10216
Mechanism of formation of corrugations on the surface of electroslag ingots
N75-10221

INITIATORS [EXPLOSIVES]
Critical energy for shock initiation of tetryl and A-5
[UCID-16469] N75-10260

INLET FLOW
The external drag of fuselage side intakes: Rectangular intakes with compression surfaces vertical
[ARC-CP-1269] N75-10025
Isolated rotor noise due to inlet distortion or turbulence
[NASA-CR-2479] N75-10094
An inlet analysis for the NASA hypersonic research engine aerothermodynamic integration model
[NASA-TM-X-3038] N75-10348
Experimental determination of the pressure recovery coefficients in conical diffusors at large subsonic velocities under various inlet conditions
[NASA-TT-F-15991] N75-10354

INLET PRESSURE
Experimental determination of the pressure recovery coefficients in conical diffusors at large subsonic velocities under various inlet conditions
[NASA-TT-F-15991] N75-10354
Performance and exit distortion of diffusers as determined by force measurements --- using laminar inlet boundary layers
N75-10361

INORGANIC COATINGS
Coatings for protecting metals under high-temperature heating and deformation
[AD-783566] N75-10465

INORGANIC COMPOUNDS
Sealed primary lithium-inorganic electrolyte cell
[AD-782819] N75-10607
Sealed lithium inorganic electrolyte cell
[AD-784072] N75-10612

INPUT/OUTPUT ROUTINES
C-LAD: A low cost LORAN-C assist device. Volume 2: Software --- application of digital computer for increased ship navigation accuracy
[AD-784313] N75-10050

INSTRUMENT LANDING SYSTEMS
A microwave model of the instrument landing system
[PB-232747/6] N75-10113

INSTRUMENT PACKAGES
OAO 2/Wisconsin Experiment Package [WEP] photometer users guide
[NASA-TM-X-72533] N75-10410

INSULATION
Development of insulation transfer-standards using a flat plate calorimeter
[NASA-CR-140710] N75-10403
Removal of insulation from multiconductor wire tape using a carbon dioxide laser
[BDX-613-887-REV] N75-10437
Insulation removal from woven-wire tape --- chemical and laser stripping
[BDX-613-1067-REV] N75-10438

INTEGRAL EQUATIONS
A multi-parameter integral method for the calculation of incompressible laminar and temperature boundary layers
[ESRO-TT-88] N75-10385
On changes of variables in kinetic theory
[TRITA-EPP-74-11] N75-10806

INTEGRATED CIRCUITS
Technology of integration of junction field effect transistors
[BMFT-FB-T-74-11] N75-10322
Production engineering measure for an Integrated Power Switch [IPS]
[AD-784317] N75-10329
Design of a mini-computer controlled digital integrated circuit tester
N75-10402
Present-day status of accelerated testing of integrated circuits
[ESRO-CR-169] N75-10474
Dispersion and instability characteristics of solid-state carrier waves in microwave integrated systems --- based on Maxwell, continuity, and Boltzmann transport equations
N75-10827

INTELSAT SATELLITES
INTELSAT 4 --- to be positioned over equator of Pacific Ocean
[NASA-NEWS-RELEASE-74-305] N75-10131

INTERFACE STABILITY
On the measurement of intermittency in turbulent flow
[IC-AERO-74-04] N75-10376

INTERFACES
Study of an interface structure design, phase 1 --- conical type structure and flat platform in beryllium
[ESS/SS-526] N75-10160

INTERFERENCE
Causes for the occurrence of pulsed interference in remote-control connection circuits
[AD-783917] N75-10333

INTERFERENCE DRAG
Interference of a sweptback wing and the fuselage at transonic speeds
[NASA-TT-F-15993] N75-10056

INTERFEROMETRY
Real time holographic interferometry
[AD-784215] N75-10432
Soviet satellite geodesy: Basis and status of Soviet laser geodesy and long-base line interferometry
[AD-781138/3] N75-10524

INTERMITTENCY HYPOTHESIS
Intermittency, the entrainment problem --- in turbulent wake flows
N75-10342

INTERNATIONAL COOPERATION
The Canadian ERTS program
N75-10550
Geodetic results from ISAGEX data --- for obtaining center of mass coordinates for geodetic camera sites
[NASA-TM-X-70763] N75-10567
International operations plan for the GARP Atlantic Tropical Experiment, parts 1, 4, 6 and 7
[GATE-9-PT-1] N75-10633

INTERNATIONAL LAW
International space law
[NASA-TT-F-15912] N75-10865

INTERNATIONAL SYSTEM OF UNITS
Metric conversion act of 1973
[GPO-27-065] N75-10862

INTERPLANETARY SPACE
Interplanetary space-A new laboratory for rarefied gas dynamics
[NASA-TM-X-72050] N75-10125

INTERSTELLAR GAS
A numerical study of protostellar formation --- the evolution of gravitationally bound gas clouds from the interstellar medium
N75-10874

INTERSTELLAR MATTER
Models of massive molecular clouds
[AD-780922/1] N75-10885
Termination of the solar wind in the hot, partially ionized interstellar medium
[NASA-CR-140699] N75-10893

INVERTED CONVERTERS [DC TO AC]
On the operating characteristics of induction motors fed by thyristor inverters
[SERIAL-150-VOL-24-NO-1] N75-10310

INVISCID FLOW
NAHAMMER: A computer program for analysis of one-dimensional pressure pulse propagation in a closed fluid system
[ANL-8059] N75-10350

ION ACCELERATORS
Ion heating in a plasma focus
[NASA-TN-D-7765] N75-10798
Study on properties of nonisothermal ion accelerator
[AD-782052] N75-10810
Acceleration of ions in heavy-current electron beams
[AD-782085] N75-10811

ION ACOUSTIC WAVES
Conversion of an ion-acoustic wave by collisions to a neutral sound wave in a nonhomogeneous plasma
[AD-782099] N75-10758

ION DENSITY [CONCENTRATION]
Radiation from plasmas in the ST Tokamak
[MATT-1077] N75-10802

ION ENGINES
On power conditioning for satellite stabilisation thrusters
[RAE-LIB-TRANS-1771] N75-10158

ION INJECTION
Two-energy component toroidal fusion devices
[MATT-1088] N75-10805

IONIZATION
In situ mass analysis of particles by surface ionization mass spectrometry
[NASA-TM-X-3112] N75-10196

IONIZED GASES
Conical electrostatic probe response in a weakly ionized gas flow --- for measuring ion density
[AD-783261] N75-10815
Termination of the solar wind in the hot, partially ionized interstellar medium
[NASA-CR-140699] N75-10893

IONOSPHERE
Conversion of an ion-acoustic wave by collisions to a neutral sound wave in a nonhomogeneous plasma
[AD-782099] N75-10758

IONOSPHERIC DISTURBANCES
Conversion of an ion-acoustic wave by collisions to a neutral sound wave in a nonhomogeneous plasma
[AD-782099] N75-10758

IONOSPHERIC ELECTRON DENSITY
The evolution of electron density and temperature distributions in the topside ionosphere during magnetic storms
[NASA-TM-X-70768] N75-10621

IRIDIUM
Influence of thermomechanical treatment on the tensile properties of a platinum 25 wt percent iridium alloy
[UCRL-75630] N75-10229
Low temperature thermophysical and mechanical properties of high purity platinum-25 w/o iridium alloy
[UCRL-75278] N75-10230

IRON
Temperature dependence of the magnetic excitations in iron and nickel
N75-10205
Thermodynamics of chemical species important to rocket technology
[AD-782028] N75-10238
An atomic model of an environmentally-affected crack in BCC iron
[AD-783725] N75-10241

ISOLATION
A root locus analysis of a seismic isolation control system --- systems analysis of gyro test facility
[AD-783615] N75-10424
Planetary quarantine: Space research and technology
[NASA-CR-140806] N75-10707

ISOMERS
Orthopositronium annihilation in liquid and solid helium
N75-10762

ISOTHERMAL PROCESSES
Study on properties of nonisothermal ion accelerator
[AD-782052] N75-10810

J

JET AIRCRAFT
Optimum rate of climb for high performance aircraft
[AD-784112] N75-10076
Lake Erie international jetport model feasibility investigation. Report 1: Scope of study and review of available data
[AD-783463] N75-10114

JET AIRCRAFT NOISE
Fluid dynamic aspects of jet noise generation
[NASA-CR-140673] N75-10088
Scale model testing of the jet noise characteristics of the JT8D refan engine nozzle system
[NASA-CR-134618] N75-10091
A computing method for sound propagation through a nonuniform jet stream
[NASA-TM-X-71941] N75-10359
The social cost of airport noise as measured by rental changes: The case of Logan Airport
N75-10849
Implementation of the Noise Control Act of 1972 [aircraft-airport noise], part 2
[GPO-33-871] N75-10864

JET CONTROL
Optimum transient response characteristic of a VTOL aircraft with direct side force control --- jet control for optimization of VTOL aircraft flight characteristics
[DLR-FB-73-72] N75-10103

JET ENGINES
An inlet analysis for the NASA hypersonic research engine aerothermodynamic integration model
[NASA-TM-X-3038] N75-10348
Propagation of waves in elliptic ducts. A theoretical study --- in view of jet engine compressor noise reduction
[NASA-CR-140652] N75-10378
Low cycle high temperature fatigue --- in aircraft jet engines: conference proceedings
[AGARD-CP-155] N75-10487
Problems of low cycle high temperature fatigue in aircraft jet engines
N75-10488
Precision in LCHTF testing --- of aircraft jet engines
N75-10490
The effect of cycle parameters on high temperature low cycle fatigue --- in aircraft jet engines
N75-10491
Lifetime prediction methods for elevated temperature fatigue --- in aircraft jet engines
N75-10493
Design procedures for elevated temperature low-cycle fatigue --- as applied to aircraft jet engines
N75-10494

JET FLOW
Flow of a two phase medium with solid particles around a thin profile
[AD-783571] N75-10393

JET IMPINGEMENT
Results of reaction control system on-orbit jet simulation using an 0.0175-scale configuration 3 space shuttle orbiter model [21-0] in the LaRC 60-foot vacuum sphere
[NASA-CR-134415] N75-10170
Heat transfer characteristics of an impinging jet in a crossflow
N75-10344

JET MIXING FLOW
The prediction of turbulent confined jet mixing with and without swirl
N75-10345
Self-excited superturbulence: The whistler nozzle
[RE-488] N75-10363
H2-Cl2 chemical laser program. Part 3: Additional arc jet laser experiments
[AD-782871] N75-10446

JET PROPULSION
Optimization of waterjet propulsion systems for surface effect ships
[AD-781916] N75-10464

JET STREAMS [METEOROLOGY]
Finite-amplitude waves in a stratified jet stream and clear air turbulence
[NASA-TT-F-16002] N75-10628

JET THRUST
Results of reaction control system on-orbit jet simulation using an 0.0175-scale configuration 3 space shuttle orbiter model [21-0] in the LaRC 60-foot vacuum sphere
[NASA-CR-134415] N75-10170

JUNCTION DIODES
Functioning of power rectifiers and thyristors from 1 January 1970 to 31 December 1972 --- noting carrier injection, emitter shorts, ignition, and breakdown
[BMFT-FB-T-74-07] N75-10319

JUNCTION TRANSISTORS
Technology of integration of junction field effect transistors
[BMFT-FB-T-74-11] N75-10322

JUPITER [PLANET]
Pioneer 11 Jupiter encounter
[NASA-NEWS-RELEASE-74-292] N75-10123
Pioneer odyssey: Encounter with a giant
[NASA-SP-349] N75-10130
Pioneer 10: Observations of energetic electrons in the Jovian magnetosphere
[NASA-CR-140676] N75-10888
Is Jupiter's magnetosphere like a pulsar's or earth's?
[NASA-CR-140600] N75-10889

K

KINETIC ENERGY
Analytical chemical kinetic investigation of the effects of oxygen, hydrogen, and hydroxyl radicals on hydrogen-air combustion
[NASA-TN-D-7769] N75-10195

KINETICS
Spectroscopic study of metal vapor kinetics
[AD-783275] N75-10265

KLYSTRONS
FM laboratory measurements on the 12GHz klystron YK 1210 [V42SK]
[ESRO-CR[P]-523] N75-10324

KOHOUTEK COMET
Calculation of NO and CO molecular spectra in the coma of a comet --- related to Kohoutek UV spectrum measurements
[MPI-PAE/EXTRATERR-98] N75-10880

L

LABORATORIES
Research highlights 1974 fiscal
[PUBL-84/7M] N75-10522

LABORATORY EQUIPMENT
JSC earth resources data analysis capabilities available to EOD revision B
[NASA-TM-X-72029] N75-10570

LAKE ERIE
Lake Erie international jetport model feasibility investigation. Report 1: Scope of study and review of available data
[AD-783463] N75-10114

LAKE ONTARIO
Hydraulic model study of surface and subsurface wind-driven currents in Lake Ontario
N75-10515
Assessment of ERTS-1 imagery as a tool for regional geological analysis in New York State --- Lake Ontario
[E74-10809] N75-10536
Dynamics of suspended sediment plumes in Lake Ontario
[E74-10815] N75-10541

LAMINAR BOUNDARY LAYER
A multi-parameter integral method for the calculation of incompressible laminar and temperature boundary layers
[ESRO-TT-88] N75-10385

LAMINAR FLOW
Second order boundary layer theory for steady, laminar, compressible flow on curved surfaces
[ESRO-TT-85] N75-10384

LAMINATES
Effect of water on the properties of a glass-polyimide laminate --- accelerated hydrolytic aging
[RM-589] N75-10186
Interaction between parallel cracks in layered composites
[WB-5/73] N75-10501

LANCE MISSILE
The 12808 Lance, missile no. 2212, round no. 235 APT [18 July 1974]
[AD-783476] N75-10644
The 12813A Lance, missile no. 2189, round no. 233 ECL [12 July 1974]
[AD-783475] N75-10645
The 14810A Lance missile nos. 2559/2561, round nos. 231 APT/232 APT [11 July 1974]
[AD-783474] N75-10646
The 12810 Lance, missile no. 2172, round no. 228 ECT [13 June 1974]
[AD-783468] N75-10648
The 12811 Lance, missile no. 2242, round no. 2242, round no. 230 ECL [28 June 1974] --- meteorological data
[AD-783473] N75-10650
The 12811 Lance, missile no. 2173, round no. 229 ECT [21 June 1974]
[AD-783471] N75-10651

LAND MANAGEMENT
Land use and mapping
N75-10560

LAND USE
Evaluation of Skylab imagery as an information service for investigating land use and natural resources --- Long Island, New York
[E74-10730] N75-10526
ERTS-1 imagery interpretation techniques in the Tennessee Valley --- land use and soil mapping
[E74-10811] N75-10538
Investigation of land use of northern megalopolis using ERTS-1 imagery
[NASA-CR-2459] N75-10545
Land use and mapping
N75-10560
Economic impact of the oil shale industry in western Colorado
[GPO-28-608] N75-10588

LANDAU-GINZBURG EQUATIONS
Statistical mechanics of one-dimensional single component Landau-Ginzburg fields
[AD-783477] N75-10848

LANDFORMS
Mineral resources, geological structures, and landform surveys
N75-10561

LANDING GEAR
Determination of the forces in the retractor of a three-dimensional landing gear mechanism
[AD-784257] N75-10078

LARGE SPACE TELESCOPE
Modern sampled-data control theory: Design of the Large Space Telescope
[NASA-CR-2457] N75-10875

LASER MATERIALS
ND-doped mixed crystal laser material research
[AD-783842] N75-10445
Laser sources --- characteristics of various laser systems and methods for controlling laser outputs
N75-10776

LASER MODE LOCKING
Studies of spin-wave mode-locking and phonon magnon interaction and the potential use of the effects for device applications
[AD-784676] N75-10838

LASER OUTPUTS
Shock-tube studies of vibrational equilibration in carbon dioxide by simultaneous laser absorption and infrared-emission measurements
N75-10346
Laser in aerodynamic testing: Local measuring methods --- velocity, concentration and temperature measurement in gas dynamics
[DLR-MITT-74-09] N75-10440
Laser sources --- characteristics of various laser systems and methods for controlling laser outputs
N75-10776
A study of beam couplers for integrated optics
[AD-784514] N75-10793

LASER RANGE FINDERS
Principle and realization of aeronautical laser systems --- characteristics and applications of laser systems for military purposes
N75-10782

LASERS
Laser rocket engines
[AD-784016] N75-10177
Flow tracing fidelity of scattering aerosol in laser Doppler velocimetry
[NASA-CR-140671] N75-10357
Laser beam deflection --- using acousto-optical grating
[BBC-RD-1974/31] N75-10434
Laser-interaction studies. Part 1: A theoretical investigation of laser supported combustion waves. Part 2: Measurements of the effect of particulate, matter on air breakdown by 1.06 micron
[AD-784356] N75-10436
Soft apertures for reducing damage in high power laser amplifier systems
[LA-5496-MS] N75-10439
A method for identifying large particles in laser anemometry --- mie scattering
[ISL-37/73] N75-10441
Soviet satellite geodesy: Basis and status of Soviet laser geodesy and long-base line interferometry
[AD-781138/3] N75-10524
A study of a dual polarization laser backscatter system for remote identification and measurement of water pollution
[NASA-CR-140665] N75-10563
Atmospheric measurements program
[AD-784374] N75-10653
The impact of opto-electronics upon avionics --- development and application of electro-optical equipment with emphasis on system design
N75-10775
An experiment to measure the modulation transfer function of the atmosphere in the marine boundary layer
[AD-783807] N75-10792
Holographic interferometry developments for dense plasmas
[AD-783511] N75-10813
Linear parametric instabilities at high pump powers
[AD-783780] N75-10814

LATERAL CONTROL
Optimum transient response characteristic of a VTOL aircraft with direct side force control --- jet control for optimization of VTOL aircraft flight characteristics
[DLR-FB-73-72] N75-10103

LATERAL STABILITY
Extraction from flight data of lateral aerodynamic coefficients for F-8 aircraft with supercritical wing
[NASA-TN-D-7749] N75-10006
LAUNCH VEHICLES
Numerical solution of the Navier-Stokes equations for rocket plumes at 120 km altitude
[AD-784332] N75-10178
LEAD [METAL]
Impact of motor gasoline lead additive regulations on petroleum refineries and energy resources, 1974-1980, phase 1
[PB-234185/7] N75-10601
LEAD COMPOUNDS
Limit lead in gasoline
[GPO-29-660] N75-10259
LEADING EDGES
On the flow around the leading edge of an aerofoil
N75-10012
Methods of visualizing the leading edge separation bubble and analysis of the results
N75-10013
LEARNING MACHINES
Research-study of a self-organizing computer
[NASA-CR-140599] N75-10715
LEAST SQUARES METHOD
Computer program for nonlinear regression using least squares
[BM-IC-8649] N75-10720
LENS DESIGN
Gradient index optics: Aspects of design, testing, tolerancing, and fabrication
N75-10770
LEVEL [HORIZONTAL]
Vortex ring generated level differences in superfluid helium
N75-10818
LEVELING
Overall study on mechanics of leveling and straightening
[SERIAL-149-VOL-23-NO-6] N75-10483
LIFE [DURABILITY]
Long-life, low-voltage, power thermal battery
[SLA-73-7069] N75-10590
LIFE SUPPORT SYSTEMS
Man in space orbit
[NASA-TT-F-15973] N75-10688
LIFT
Low-speed wing-tunnel measurements of the lift, drag and pitching moment of a series of cropped delta wings
[ARC-R/M-3744] N75-10030
LIFT AUGMENTATION
Performance improvement through control configured vehicle concept --- active control systems for aircraft life augmentation
[NASA-TT-F-15998] N75-10059
LIFT DEVICES
The nature, development and effect of the viscous flow around an aerofoil with high-lift devices
[ARC-CP-1258] N75-10021
LIFT DRAG RATIO
The design of a series of warped slender wings for subsonic speeds
[ARC-CP-1263] N75-10022
LIFTING BODIES
Lifting surface theory applied to fixed wings and propellers
N75-10016
LIGHT ELEMENTS
Recent improvements in the light element microanalyser
N75-10014
LIGHT EMITTING DIODES
Display devices and their use in avionics systems --- factors affecting selection and performance of electro-optical sensors
N75-10778
LIGHT MODULATION
An investigation of electro-optical modulation methods in GaSs epitaxial thin film waveguides at 10.6 micron wavelength
N75-10817
LIGHT SCATTERING
An analysis of the spectral distribution of light quasi-elastically scattered from high molecular weight polymer solutions in the lower critical temperature region
N75-10250
Laser in aerodynamic testing: Local measuring methods --- velocity, concentration and temperature measurement in gas dynamics
[DLR-MITT-74-09] N75-10440
Development of programs for computing characteristics of ultraviolet radiation
[NASA-CR-139134] N75-10746
LIGHT TRANSMISSION
Light refraction by mean temperature gradients in the near-earth atmosphere
[AD-783484] N75-10790
LIGHTNING
Proceedings of the Waldorf Conference on Long Range Geographic Estimation of Lightning Sources
[AD-784393] N75-10624
LINE SPECTRA
The influence of self-focusing on the stimulated line of the Rayleigh wing
N75-10771
A comparison of lyman alpha and He lambda 10830 line structures and variations in early-type star atmospheres
[NASA-CR-140572] N75-10876
LINEAR AMPLIFIERS
UHF amplifiers: Improvement of linearity by pre-correction
[BBC-RD-1974/32] N75-10275
LINKAGES
Determination of the forces in the retractor of a three-dimensional landing gear mechanism
[AD-784257] N75-10078
LIPIDS
Ultrasonic absorption by phospholipid vesicles; acoustic impedance matching and the design of broad-band piezoelectric transducers
N75-10751
LIQUEFACTION
Evaluation of coal conversion processes to provide clean fuels, part 2
[PB-234203/8] N75-10604
LIQUID AMMONIA
Heat transfer investigations of a regeneratively cooled, 1 kN thrust, fluorine/ammonia engine
[ESRO-TT-93] N75-10173
LIQUID CRYSTALS
Optical and Faraday studies of liquid crystals
N75-10825
LIQUID FLOW
Piston unit for rate modulation of a liquid flow --- in liquid propellant transfer noting POGO effect
N75-10372
LIQUID HELIUM
Vortex ring generated level differences in superfluid helium
N75-10818
LIQUID METALS
Electroslag remelting
[JPRS-63220] N75-10212
Indirect determination of specific heat fluxes in the crystallizer wall during EShP
N75-10214
Electroslag remelting in multipass crystallizers
N75-10216
Some characteristics of EShP of metal in consumable crystallizers
N75-10220
Classification and bases of mathematical description of metallurgical processes of refining liquid metal
N75-10224
Reliability of liquid-metal induction MHD machines
[AD-784208] N75-10606
LIQUID PHASES
Liquid phase sintered compacts in space
[NASA-CR-120507] N75-10122
Calculated liquid phase thermodynamic properties and liquid-vapor equilibria for fluorine-oxygen [FLOX] mixtures
[NASA-CR-140709] N75-10844
LIQUID PROPELLANT ROCKET ENGINES
Liquid rocket engine turbopump gears
[NASA-SP-8100] N75-10166
Fabrication of liquid-rocket thrust chambers by electroforming
[NASA-TM-X-3116] N75-10172
Heat transfer investigations of a regeneratively cooled, 1 kN thrust, fluorine/ammonia engine
[ESRO-TT-93] N75-10173
LIQUID SODIUM
NAHAMMER: A computer program for analysis of one-dimensional pressure pulse propagation in a closed fluid system
[ANL-8059] N75-10350
LIQUID-VAPOR EQUILIBRIUM
Calculated liquid phase thermodynamic properties and liquid-vapor equilibria for fluorine-oxygen [FLOX] mixtures
[NASA-CR-140709] N75-10844
LIQUIDS
Study to define behavior of liquid lubricants in an elastohydrodynamic contact
[NASA-CR-134671] N75-10455
LITHIUM
About the use of lithium-containing propellants in rocket propulsion units with FLOX as oxidizer. Part 1: Parameter study --- with hydrocarbon binders
[ESRO-TT-87] N75-10263
Observations of lithium dilution and rotational velocity decay in F and G giant stars
N75-10873
LITHIUM COMPOUNDS
Sealed primary lithium-inorganic electrolyte cell
[AD-782819] N75-10607
Sealed lithium inorganic electrolyte cell
[AD-784072] N75-10612
LITTLE JOHN ROCKET VEHICLE
The 16301 Little John missile no. 3194, round no. 715 RM[27 June 1974]
[AD-783472] N75-10647
The 16101 Little John, missle no. 3094, round no. 714 RM [19 June 1974]
[AD-783470] N75-10649
LOAD DISTRIBUTION [FORCES]
Evaluation of the accuracy of two helicopter rotor theories
[FFA-124] N75-10020
LOADING OPERATIONS
An exploratory flight investigation of helicopter sling-load placements using a closed-circuit television as a pilot aid
[NASA-TN-D-7776] N75-10009
LOADS [FORCES]
On the non-existence of adjacent equilibrium states at bifurcation points
[AD-783336] N75-10510
LOGIC CIRCUITS
Algorithms and logical networks
[AD-783426] N75-10727
LOGISTICS MANAGEMENT
Interservice utility helicopter reliability and maintainability comparative analysis
[AD-784177] N75-10080
LONG ISLAND [NY]
Evaluation of Skylab imagery as an information service for investigating land use and natural resources --- Long Island, New York
[E74-10730] N75-10526
LONGITUDINAL STABILITY
Effect of ELEVON gap configurations on the longitudinal stability and control effectiveness of the 43-0 space shuttle orbiter [OA118]
[NASA-CR-134407] N75-10152
Loss of stability of a cylindrical shell on longitudinal impact
[AD-783570] N75-10505
LORAN C
C-LAD: A low cost LORAN-C assist device. Volume 1: Hardware --- application of digital computer for increased ship navigation accuracy
[AD-784312] N75-10049
C-LAD: A low cost LORAN-C assist device. Volume 2: Software --- application of digital computer for increased ship navigation accuracy
[AD-784313] N75-10050
C-LAD: A low cost LORAN-C assist device. Volume 3: Operating procedure --- application of digital computer for increased ship navigation accuracy
[AD-784314] N75-10051
LOUISIANA
A review of initial investigations to utilize ERTS-1 data in determining the availability and distribution of living marine resources --- harvest and management of fisheries resources in Mississippi Sound and Gulf waters
N75-10555
LOW DENSITY FLOW
Drag measurements on plates parallel to the flow, and on discs perpendicular to the flow, in supersonic highly rarefied free jets
[ESRO-TT-91] N75-10386
Influence of the viscous interaction parameter on the aerodynamic coefficients and on the heat transfer of a reentry body at very low densities for the whole region of angle of attack
[ESRO-TT-95] N75-10387
Experimental and computational study of the low-density plasma in the outer regions of a theta pinch
[LRP-85/74] N75-10808
LOW FREQUENCIES
A two-dimensional aerofoil oscillating at low frequencies in high subsonic flow
[ARC-CP-1285] N75-10027
Target identification by means of low frequency radar returns
[AD-783224] N75-10293
LOW PASS FILTERS
A practical on-line filter to process gyrocompass data
[AD-783250] N75-10048
LOW TEMPERATURE PHYSICS
Heat transport in porous insulations at cryogenic temperatures
N75-10339
LOW TEMPERATURE TESTS
Low temperature thermophysical and mechanical properties of high purity platinum-25 w/o iridium alloy
[UCRL-75278] N75-10230
High purity germanium-low temperature Hall analyses
[UCRL-74832] N75-10831
LOW THRUST PROPULSION
On power conditioning for satellite stabilisation thrusters
[RAE-LIB-TRANS-1771] N75-10158
LUBRICANTS
Study to define behavior of liquid lubricants in an elastohydrodynamic contact
[NASA-CR-134671] N75-10455
LUBRICATING OILS
A nucleonic oil debris monitor for detecting metal in recirculating lubricating systems
[AD-784137] N75-10428

LUMINOSITY
Mechanical oscillator in a luminous flux
[AD-783760] N75-10796

LUNAR EXPLORATION
Earth - Space - Moon --- spacecraft exploration of moon
[NASA-TT-F-800] N75-10886

LUNAR PHASES
The effects of lunar cycles and diurnal rhythms on activity, exploration, and elicited aggression in rats and mice
N75-10677

LUNAR ROCKS
Dielectric constants and dissipation factors of simulated lunar rocks
[PB-234053/7] N75-10575

LUNAR SPACECRAFT
Earth - Space - Moon --- spacecraft exploration of moon
[NASA-TT-F-800] N75-10886

LUNAR SURFACE VEHICLES
Man in space orbit
[NASA-TT-F-15973] N75-10688

LYMAN ALPHA RADIATION
A comparison of lyman alpha and He lambda 10830 line structures and variations in early-type star atmospheres
[NASA-CR-140572] N75-10876

M

MACHINE ORIENTED LANGUAGES
HAL/S-360 user's manual
[NASA-CR-140255] N75-10102

MAGNESIUM ALLOYS
Structure dependence of high temperature deformation of metals
[SU-326-P-17-X-5] N75-10498

MAGNESIUM CHLORIDES
Effect of composition on stress corrosion cracking of austenitic stainless steels in several concentrations of boiling MgCl2 solutions
[NASA-TT-F-15995] N75-10207

MAGNETIC ANOMALIES
Geologic and geomagnetic background noise in two areas of the North Atlantic, phase 1 --- magnetic interference arising from sea floor geology
[AD-783693] N75-10627

MAGNETIC CIRCUITS
Calculating synchronous inductive reactances of contactless machines when magnetic circuit is saturated and of machines with superconducting excitation windings
[AD-784696] N75-10328

MAGNETIC CONTROL
The effects of impurities and magnetic divertors on high-temperature tokamaks
[MATT-1079] N75-10804

MAGNETIC CORES
Ferrite-core transformer bonding and potting
[BDX-613-992] N75-10315

MAGNETIC DISTURBANCES
Magnetic variations caused by wind waves
[AD-783944] N75-10626

MAGNETIC EFFECTS
Turbulent magnetic fields in a collision dominated plasma
[PSU-IRL-SCI-432] N75-10800

MAGNETIC FIELDS
Harmonic components, of the magnetic conductivity of the air gap of electric motors on a gear surface
[AD-783930] N75-10334
The influence of magnetic field on turbulent flow with a shift
[AD-784702] N75-10395

MAGNETIC FLUX
Temperature dependence of the magnetic excitations in iron and nickel
N75-10205

MAGNETIC INDUCTION
Calculation of inductive plasma accelerators with sinusoidal electromagnetic standing waves for continuous energy supply
[ESRO-TT-76] N75-10809

MAGNETIC PERMEABILITY
Statistical mechanics of one-dimensional single component Landau-Ginzburg fields
[AD-783477] N75-10848

MAGNETIC PROPERTIES
Selection of composition and heat treatment of cast magnetic alloys
[AD-783765] N75-10237

MAGNETIC STORMS
The evolution of electron density and temperature distributions in the topside ionosphere during magnetic storms
[NASA-TM-X-70768] N75-10621

MAGNETIC SUSPENSION
Design and development of a momentum wheel with a mainly passive magnetic bearing. Volume 1: Design report, phase 1
[ESRO-CR(P)-505-VOL-1] N75-10161

MAGNETOACOUSTICS
Studies of spin-wave mode-locking and phonon magnon interaction and the potential use of the effects for device applications
[AD-784676] N75-10838

MAGNETOHYDRODYNAMIC FLOW
Two-dimensional flow inside MHD ducts with transverse asymmetries
N75-10364

MAGNETOHYDRODYNAMIC GENERATORS
Reliability of liquid-metal induction MHD machines
[AD-784208] N75-10606
Experimental and analytical research on a two megawatt, high performance MHD generator
[AD-783267] N75-10610

MAGNETOHYDRODYNAMIC STABILITY
Low-frequency instabilities and plasma turbulence --- steady state and time dependent characteristics of positive column and hollow cathode discharge
N75-10797
Physical mechanism of parametric instabilities near the lower hybrid frequency in inhomogeneous plasma
[MATT-1069] N75-10801

MAGNETOHYDRODYNAMICS
One-dimensional equations for MHD channel flows
N75-10365
CO2 MHD laser: Analysis, design and shock tunnel experiments
[AD-782226] N75-10443
Magnetogasdynamic compression of a coaxial plasma accelerator flow for micrometeoroid simulation
[NASA-TR-R-435] N75-10799

MAGNETOMETERS
Magnetic variations caused by wind waves
[AD-783944] N75-10626

MAGNETOSPHERE
Proposal for an experiment for the ESRO geostationary magnetospheric satellite
N75-10144

MAGNONS
Conduction electrons and magnetism
[AD-783401] N75-10839

MAGNUS EFFECT
Contribution of a wall shear stress to the Magnus effect on nose shapes
[AD-784145] N75-10400

MANAGEMENT PLANNING
Automated scheduling of manufacturing resources
[BDX-613-1077] N75-10269
Third Earth Resources Technology Satellite Symposium. Volume 2: Summary of results
[NASA-SP-356] N75-10549

MANGANESE
A semi-delphi exercise on fluorspar and manganese in steelmaking
[NMAB-317] N75-10273

MANNED SPACE FLIGHT
Man in space orbit
[NASA-TT-F-15973] N75-10688

MANUAL CONTROL
Methods of investigation for manual control processes
[FB-15] N75-10738

MANUFACTURING
Automated scheduling of manufacturing resources
[BDX-613-1077] N75-10269
Heat pipe manufacturing study
[NASA-CR-139140] N75-10347

MAPPING
Orbital geology --- an aid to mineral exploration and mapping the earth's surface
[NASA-TT-F-16000] N75-10887

MARINE BIOLOGY
A study of lagoonal and estuarine processes in the area of Merritt Island encompassing the space center
[NASA-CR-140601] N75-10670

MARINE ENVIRONMENTS
Remote sensing applications in marine science programs at VIMS
[NASA-CR-137475] N75-10566
The Coho Project: Living resources prediction feasibility study, volume 1 --- meteorological forecasting of fish concentrations
[PB-234057/8] N75-10681
The Coho Project: Living resources prediction feasibility study. Volume 2: Environmental report
[PB-234058/6] N75-10682

MARINE PROPULSION
Optimization of waterjet propulsion systems for surface effect ships
[AD-781916] N75-10464

MARINER SPACE PROBES
Trajectory selection for the Mariner Jupiter/Saturn 1977 project
[NASA-CR-140704] N75-10142
Mariner Mars 1971 attitude control subsystem
[NASA-CR-140706] N75-10168

MARINER 9 SPACE PROBE
Mariner Mars 1971 television picture catalog. Volume 1, addendum 1: Experiment design and picture data
[NASA-CR-140700] N75-10890

MARITIME SATELLITES
In-harbor and at-sea electromagnetic compatibility survey for maritime satellite L-band shipboard terminal
[NASA-CR-139131] N75-10284

MARKETING
Market performance and competition in the petroleum industry, part 2
[GPO-28-740] N75-10855

MARKOV PROCESSES
Digital modeling in statistical radio engineering
[AD-783732] N75-10294

MARS SURFACE
Mariner Mars 1971 television picture catalog. Volume 1, addendum 1: Experiment design and picture data
[NASA-CR-140700] N75-10890

MARTENSITIC STAINLESS STEELS
Thermoelastic heat effects in equiatomic NiTi
[RM-592] N75-10226

MASS SPECTROMETERS
In situ mass analysis of particles by surface ionization mass spectrometry
[NASA-TM-X-3112] N75-10196

MASSACHUSETTS
The social cost of airport noise as measured by rental changes: The case of Logan Airport
N75-10849

MATERIALS HANDLING
Slow descent recovery system technology study and data program
[AD-783268] N75-10032
Helicopter dropsight
[AD-784551] N75-10084

MATHEMATICAL MODELS
Classification and bases of mathematical description of metallurgical processes of refining liquid metal
N75-10224
Models of subjective response to in-flight motion data
[NASA-CR-140675] N75-10708
Reliable results from stochastic simulation models
[USDA-NE-277] N75-10735
Acoustic scattering from a sphere with nonuniform surface impedance --- mathematical method for computing overpressure in near and far fields
[AD-783805] N75-10757
A model for gas-surface distribution functions
[RM-591] N75-10829

MATHEMATICAL TABLES
Tabulated values of combinations of cyclic and hyperbolic functions
N75-10052

MEAN
Light refraction by mean temperature gradients in the near-earth atmosphere
[AD-783484] N75-10790

MEASURE AND INTEGRATION
A calculation method for the two dimensional turbulent flow over a slotted flap
[ARC-CP-1267] N75-10023

MEASURING INSTRUMENTS
NASA-Langley helicopter tower instrumentation systems
[NASA-CR-132522] N75-10106
The geometrical accuracy of electrical wires and the interference effects on small measuring objects
[FOA-2-C-2539-D4] N75-10415
Autocorrelation and spectral methods of measuring speed of motion
[AD-783973] N75-10422
Modern trends in environmental testing
[SLA-73-5931] N75-10469

MECHANICAL DEVICES
Determination of the forces in the retractor of a three-dimensional landing gear mechanism
[AD-784257] N75-10078
Vibratory deburring
[BDX-613-735-REV] N75-10268

MECHANICAL DRIVES
Thermal vacuum qualification test of No. 1 Hawker Siddeley Dynamics low speed mechanism --- for solar paddles
[ESRO-ESTL-3] N75-10461

MECHANICAL OSCILLATORS
Mechanical oscillator in a luminous flux
[AD-783760] N75-10796

MECHANICAL PROPERTIES
Effect of water on the properties of a glass-polyimide laminate --- accelerated hydrolytic aging
[RM-589] N75-10186
Structure and properties of alloys for atomic energy
N75-10204
The effect of ausworking on the strength of type 420 stainless steel with the addition of carbide-forming elements
N75-10206
Investigating the quality of welded electroslag joints of rotors 1500 MM in diameter of 25[KHN3MF] steel of electroslag and electrofurnace smelting
N75-10222
Relationship between microstructure and fracture toughness in D6ac steel
[ARL/MET-NOTE-103] N75-10227

High temperature texture strengthening in alpha-titanium
[AD-784213] N75-10240
Effect of electron irradiation on mechanical properties and structure of aluminum
[AD-784321] N75-10242
Effect of selected impurities on the high temperature mechanical properties of hot-pressed silicon nitride
[AD-783506] N75-10255

MEDICAL SERVICES
Outpatient medical costs related to air pollution in the Portland, Oregon area
[EPA-600/5-74-017] N75-10692

MEGALOPOLISES
Investigation of land use of northern megalopolis using ERTS-1 imagery
[NASA-CR-2459] N75-10545

METAL BONDING
Characterization of metals melting discs Skylab experiment M551
[NASA-CR-129041] N75-10118
Convection effects on Skylab experiments M551, M552, and M553, phase C report --- metal melting, exothermic brazing, and sphere forming under weightless conditions
[NASA-CR-120482] N75-10120

METAL COATINGS
Heat resistant coatings obtained by chemical deposition from solutions
[AD-783981] N75-10183

METAL CRYSTALS
Single crystals of metal solid solutions
[NASA-CR-120511] N75-10225

METAL FATIGUE
An overview of high temperature metal fatigue: Aspects covered by the 1973 International Conference on Creep and Fatigue
N75-10489
Fatigue endurance, crack sensitivity and nucleation characteristics of structural elements in four aluminium-copper alloys
[ARC-CP-1259] N75-10503
Significance of cyclic history dependent deformation phenomena of metals on fatigue life estimation
[AD-784277] N75-10507

METAL HYDRIDES
Hydrogen in metals: A new theoretical model
[SLA-73-5810] N75-10233

METAL IONS
Radiation from plasmas in the ST Tokamak
[MATT-1077] N75-10802

METAL JOINTS
Investigating the quality of welded electroslag joints of rotors 1500 MM in diameter of 25[KHN3MF] steel of electroslag and electrofurnace smelting
N75-10222

METAL MATRIX COMPOSITES
Tungsten-reinforced oxidation-resistant columbium alloys
[AD-783985] N75-10192

METAL OXIDES
Transition metal oxides: Crystal chemistry, phase transition and related aspects
[NSRDS-NBS-49] N75-10193

METAL PARTICLES
The ignition limit of a conglomerate of metal particles
[AD-782073] N75-10197

METAL POWDER
Dehydriding of titanium alloy [Ti-6246] hydrided powder
[AD-783235] N75-10249

METAL SHEETS
Electroslag remelting during production of sheet steel
N75-10215

METAL VAPORS
The ignition limit of a conglomerate of metal particles
[AD-782073] N75-10197
Spectroscopic study of metal vapor kinetics
[AD-783275] N75-10265

METAL WORKING
Convection effects on Skylab experiments M551, M552, and M553, phase C report --- metal melting, exothermic brazing, and sphere forming under weightless conditions
[NASA-CR-120482] N75-10120
Coatings for protecting metals under high-temperature heating and deformation
[AD-783566] N75-10465
Overall study on mechanics of leveling and straightening
[SERIAL-149-VOL-23-NO-6] N75-10483

METALLOGRAPHY
NRL progress report, January 1974
[PB-233882/0] N75-10748

METALLURGY
Technologic and related trends in the mineral industries, 1973
[PB-233997/6] N75-10271
NRL progress report, February 1974 --- research on the structure of matter
[PB-233883/8] N75-10749

METALS
Research on varied properties of metals, ceramics, polymers, and alloys
[AD-783964] N75-10185
A nucleonic oil debris monitor for detecting metal in recirculating lubricating systems
[AD-784137] N75-10428

METEOROID SHOWERS
Physical and dynamical studies of meteors --- radar observation of fragmentation
[NASA-CR-132534] N75-10891

METEOROLOGICAL CHARTS
The 12808 Lance, missile no. 2212, round no. 235 APT [18 July 1974]
[AD-783476] N75-10644
The 12813A Lance, missile no. 2189, round no. 233 ECL [12 July 1974]
[AD-783475] N75-10645
The 14810A Lance missile nos. 2559/2561, round nos. 231 APT/232 APT [11 July 1974]
[AD-783474] N75-10646
The 16301 Little John missile no. 3194, round no. 715 RM[27 June 1974]
[AD-783472] N75-10647
The 12810 Lance, missile no. 2172, round no. 228 ECT [13 June 1974]
[AD-783468] N75-10648
The 16101 Little John, missle no. 3094, round no. 714 RM [19 June 1974]
[AD-783470] N75-10649
Tables and conversions for microclimatology
[PB-234158/4] N75-10655

METEOROLOGICAL PARAMETERS
The 12811 Lance, missile no. 2242, round no. 2242, round no. 230 ECL [28 June 1974] --- meteorological data
[AD-783473] N75-10650
The 12811 Lance, missile no. 2173, round no. 229 ECT [21 June 1974]
[AD-783471] N75-10651
Atmospheric properties and their effect on target acquisition under flare illumination
[AD-783052] N75-10665
Meteorological study for Tooele Army Depot, Volume 1
[AD-784572] N75-10666
Meteorological study for Tooele Army depot, volume 2
[AD-784573] N75-10667

METEOROLOGICAL SATELLITES
Satellite operations plan
N75-10635

METHOD OF CHARACTERISTICS
Calculation of the plane supersonic flow through cascades using the method of analytical characteristics
[ESRO-TT-78] N75-10383

METHYL ALCOHOLS
Elimination of duty on methanol imported for certain uses
[H-REPT-93-998] N75-10857

METRIC SPACE
Topological properties of charge algebras
[RR-143/MBR/KPSBR-5] N75-10734

MICE
The effects of lunar cycles and diurnal rhythms on activity, exploration, and elicited aggression in rats and mice
N75-10677

MICROANALYSIS
Aerospace Research --- topics on airfoil profiles, flow visualization, ablative materials, microanalysis, and filter analysis
[ESRO-TT-90] N75-10011
Recent improvements in the light element microanalyser
N75-10014
Electron energy loss spectrometry
[BMFT-FB-T-74-06] N75-10788

MICROCLIMATOLOGY
Tables and conversions for microclimatology
[PB-234158/4] N75-10655

MICROCRACKS
Analytical modeling of defects in solids --- including edge dislocations and microcracks
N75-10824

MICROELECTRONICS
Progressive methods of producing microcircuits
N75-10307
Micro-electric motors running on a pulsating current on constant voltage
N75-10308
Electromagnetic radiation screening of microcircuits for long life applications
[NASA-CR-120512] N75-10311

MICROMETEOROIDS
Magnetogasdynamic compression of a coaxial plasma accelerator flow for micrometeoroid simulation
[NASA-TR-R-435] N75-10799

MICROORGANISMS
Geochemical activity of soil microorganisms as an integral part of biogeocenosis
[NASA-TT-F-15976] N75-10565

MICROSTRUCTURE
Relationship between microstructure and fracture toughness in D6ac steel
[ARL/MET-NOTE-103] N75-10227
Hydrogen in metals: A new theoretical model
[SLA-73-5810] N75-10233
Effect of electron irradiation on mechanical properties and structure of aluminum
[AD-784321] N75-10242

MICROWAVE RADIOMETERS
S-193 scatterometer transfer function analysis for data processing
[NASA-CR-140314] N75-10569

MIDAIR COLLISIONS
Annual review of aircraft accident data: US General Aviation calendar year 1971
[NTSB-ARG-74-2] N75-10037

MIE SCATTERING
A method for identifying large particles in laser anemometry --- mie scattering
[ISL-37/73] N75-10441

MIGRATION
Utilization of Skylab [EREP] system for appraising changes in continental migratory bird habitat
[E74-10817] N75-10543
Utility of ERTS for monitoring the breeding habit of migratory waterfowl --- United States and Canada
N75-10557

MILITARY AIRCRAFT
Head-up display optics --- application to weapon aiming systems in military aircraft
N75-10780

MILITARY HELICOPTERS
Elastic pitch beam tail rotor operational suitability investigation
[AD-784595] N75-10069
Low temperature testing of an AH-1G helicopter equipped with elastomeric flapping and feathering bearings in the main rotor
[AD-784189] N75-10081
Yaw axis stability augmentation system flight test report --- flight tests of H-58 helicopter
[AD-784134] N75-10083

MINERAL DEPOSITS
Geologic and mineral and water resources investigations in Western Colorado, using Skylab EREP data
[E74-10802] N75-10530

MINERAL EXPLORATION
Orbital geology --- an aid to mineral exploration and mapping the earth's surface
[NASA-TT-F-16000] N75-10887

MINERALS
Technologic and related trends in the mineral industries, 1973
[PB-233997/6] N75-10271
Mineral resources, geological structures, and landform surveys
N75-10561
Geochemical activity of soil microorganisms as an integral part of biogeocenosis
[NASA-TT-F-15976] N75-10565
Applications of the direct photon absorption technique for measuring bone mineral content in vivo. Determination of body composition in vivo
[NASA-CR-140708] N75-10694
Skeletal status and soft tissue composition in astronauts. Tissue and fluid changes by radionuclide absorptiometry in vivo
[NASA-CR-140689] N75-10695
Skeletal status and soft tissue composition in astronauts. Tissue and fluid changes by radionuclide absorptiometry in vivo
[NASA-CR-140703] N75-10696

MINICOMPUTERS
Design of a mini-computer controlled digital integrated circuit tester
N75-10402
Implementation of a mini-computer based information system. Part 1: System overview
[DSIS-TN-16-PT-1] N75-10725

MINUTEMAN ICBM
Conversion of a D17B [Minuteman 1] guidance computer to acquire and process evoked response information
N75-10714

MIRRORS
Test program on the contamination of ultraviolet region mirrors by Apollo Telescope Mount materials
[NASA-CR-120516] N75-10772

MISSILE CONFIGURATIONS
Aerodynamic symmetry of aircraft and guided missiles --- development of configurations to eliminate certain force and moment derivatives
[AD-784254] N75-10070

MISSILE CONTROL
Computer functional requirements study, volume I
[AD-782078/0] N75-10719

MISSILE RANGES
The 12808 Lance, missile no. 2212, round no. 235 APT [18 July 1974]
[AD-783476] N75-10644
The 12813A Lance, missile no. 2189, round no. 233 ECL [12 July 1974]
[AD-783475] N75-10645

The 14810A Lance missile nos. 2559/2561, round nos. 231 APT/232 APT [11 July 1974]
[AD-783474] N75-10646
The 16301 Little John missile no. 3194, round no. 715 RM[27 June 1974]
[AD-783472] N75-10647
The 12810 Lance, missile no. 2172, round no. 228 ECT [13 June 1974]
[AD-783468] N75-10648
The 16101 Little John, missle no. 3094, round no. 714 RM [19 June 1974]
[AD-783470] N75-10649

MISSILES
Direct statistical analysis of missile guidance systems via cadet [covariance analysis describing function technique]
[AD-783098] N75-10162

MISSION PLANNING
Three models for scheduling space shuttle missions and resources
[NASA-CR-140319] N75-10127
Mission operation report: Applications Technology Satellite [ATS-F]
[NASA-TM-X-72530] N75-10141

MISSISSIPPI
A review of initial investigations to utilize ERTS-1 data in determining the availability and distribution of living marine resources --- harvest and management of fisheries resources in Mississippi Sound and Gulf waters
N75-10555

MISSISSIPPI DELTA [LA]
A review of initial investigations to utilize ERTS-1 data in determining the availability and distribution of living marine resources --- harvest and management of fisheries resources in Mississippi Sound and Gulf waters
N75-10555

MISSISSIPPI RIVER [US]
Geographic applications of ERTS-1 imagery to landscape change --- Mississippi River and Great Smoky Mountains of Tennessee and North Carolina
[E74-10810] N75-10537

MODULATION
Piston unit for rate modulation of a liquid flow --- in liquid propellant transfer noting POGO effect
N75-10372
An experiment to measure the modulation transfer function of the atmosphere in the marine boundary layer
[AD-783807] N75-10792

MODULES
Advanced heat source concepts --- module design for space electric power generation
[MLM-2134] N75-10591

MOLECULAR BEAMS
Skimming of molecular beams from diverging nonequilibrium gas jets
[DLR-FB-74-28] N75-10761

MOLECULAR RELAXATION
Analytical and experimental research on HF chemical lasers
[AD-784590] N75-10444

MOLECULAR SPECTRA
Calculation of NO and CO molecular spectra in the coma of a comet --- related to Kohoutek UV spectrum measurements
[MPI-PAE/EXTRATERR-98] N75-10880

MOLECULAR STRUCTURE
Research investigation directed toward extending the useful range of the electromagnetic spectrum --- atomic spectra and electronic structure of alkali metals
[NASA-CR-140678] N75-10272
NRL progress report, February 1974 --- research on the structure of matter
[PB-233883/8] N75-10749

MOMENTS OF INERTIA
Experimental determination of airplane mass and inertial characteristics
[NASA-TR-R-433] N75-10062

MOMENTUM
Design and development of a momentum wheel with a mainly passive magnetic bearing. Volume 1: Design report, phase 1
[ESRO-CR[P]-505-VOL-1] N75-10161

MONITORS
Performance monitor system functional simulator, environmental data, orbiter 101[HFT]
[NASA-TM-X-72028] N75-10136
A nucleonic oil debris monitor for detecting metal in recirculating lubricating systems
[AD-784137] N75-10428

MOON
Earth - Space - Moon --- spacecraft exploration of moon
[NASA-TT-F-800] N75-10886

MOTION SICKNESS
Motion sickness
[NASA-TT-F-15864] N75-10685

MOVING TARGET INDICATORS
Design of digital moving target indication radar processors
N75-10278

MULTIPLEXING
Multipath compensation of a DQPSK communication link
N75-10277

MULTISPECTRAL PHOTOGRAPHY
Application of multispectral color photography to flame flow visualization
[DLR-MITT-74-23] N75-10420
Evaluation of Skylab imagery as an information service for investigating land use and natural resources --- Long Island, New York
[E74-10730] N75-10526
Developing processing techniques for Skylab data --- vegetation and soil identification
[E74-10799] N75-10527
Overall evaluation of ERTS-1 imagery for cartographic application --- Australia, Antarctica, U.S., and U.S.S.R.
[E74-10800] N75-10528
An interdisciplinary analysis of multispectral satellite data for selected cover types in the Colorado Mountains, using automatic data processing techniques
[E74-10803] N75-10531
Skylab a proposal aerotriangulation with very small scale photography --- North Carolina and Virginia
[E74-10804] N75-10532
Thailand national programme of the Earth Resources Technology Satellite
[E74-10806] N75-10533
The Thailand programme of the Earth Resources Technology Satellite
[E74-10807] N75-10534
Assessment of ERTS-1 imagery as a tool for regional geological analysis in New York State --- Lake Ontario
[E74-10809] N75-10536
ERTS-1 imagery interpretation techniques in the Tennessee Valley --- land use and soil mapping
[E74-10811] N75-10538
Skylab-EREP investigations of wetlands ecology --- New Jersey and Chesapeake Bay
[E74-10816] N75-10542
Utilization of Skylab [EREP] system for appraising changes in continental migratory bird habitat
[E74-10817] N75-10543
Geologic evaluation and applications of ERTS-1 imagery over Georgia
N75-10552

N

NASA PROGRAMS
Astronautics and aeronautics, 1972 --- a chronology of events
[NASA-SP-4017] N75-10129

NATURAL GAS
Geochemistry of liquids, gases, and rocks from the Smackover formation
[PB-233427/4] N75-10525
Oil and Gas Energy Tax Act of 1974
[H-REPT-93-1028-PT-2] N75-10866

NAVIER-STOKES EQUATION
Numerical solution of the Navier-Stokes equations for rocket plumes at 120 km altitude
[AD-784332] N75-10178
One method of numerical solution of the Navier-Stokes equations for a compressible gas
[NASA-TT-F-15992] N75-10355

NAVIGATION AIDS
An adaptive technique for a redundant-sensor navigation system
[NASA-CR-140313] N75-10042
An azimuth determination system using the Navy navigation satellites
[AD-784375] N75-10047
C-LAD: A low cost LORAN-C assist device. Volume 2: Software --- application of digital computer for increased ship navigation accuracy
[AD-784313] N75-10050

NAVIGATION INSTRUMENTS
C-LAD: A low cost LORAN-C assist device. Volume 1: Hardware --- application of digital computer for increased ship navigation accuracy
[AD-784312] N75-10049

NAVIGATION SATELLITES
An azimuth determination system using the Navy navigation satellites
[AD-784375] N75-10047
Propagation effects at radio frequencies on satellite navigation systems --- atmospheric effects on radio transmission
[AD-784378] N75-10747

NEBULAE
Radio recombination line observation of the CII region NGC2023
[AD-783983] N75-10883

NEODYMIUM
ND-doped mixed crystal laser material research
[AD-783842] N75-10445

NETHERLANDS
The economics of using wind power for electricity supply in the Netherlands and for water supply on Curacao
[NASA-TT-F-15982] N75-10587
Does representative ground wind measurement exist? --- velocity data terrain transformation
[KNMI-V-257] N75-10640

NETWORK ANALYSIS
Module level diagnosis of combinational networks
N75-10740

NEUTRONS
Temperature dependence of the magnetic excitations in iron and nickel
N75-10205

NEW HAMPSHIRE
Data analysis support for UNH gamma ray detector on OSO-7
[NASA-CR-140597] N75-10139

NEW JERSEY
Skylab-EREP investigations of wetlands ecology --- New Jersey and Chesapeake Bay
[E74-10816] N75-10542

NEW YORK
Assessment of ERTS-1 imagery as a tool for regional geological analysis in New York State --- Lake Ontario
[E74-10809] N75-10536

NICKEL
Temperature dependence of the magnetic excitations in iron and nickel
N75-10205
Further observations on the effect of grain boundary segregation in the hydrogen embrittlement of nickel
[AD-783103] N75-10248

NICKEL ALLOYS
Research study on materials processing in space experiment number M512: Nickel - 12 wt percent tin alloy evaluation
[NASA-CR-129038] N75-10119
Thermal-structural evaluation of TD Ni-20Cr thermal protection system panels
[NASA-CR-132487] N75-10155
Particle size distribution effects in precipitation hardening
[UCLA-34-P-172-11] N75-10232
Selection of composition and heat treatment of cast magnetic alloys
[AD-783765] N75-10237

NICKEL CADMIUM BATTERIES
Evaluation program for secondary spacecraft cells: Initial evaluation tests of General Electric Company 12.0 ampere-hour, nickel-cadmium spacecraft cells for the international ultraviolet Explorer satellite
[NASA-CR-140672] N75-10583
Testing of NiCd cells over geostationary orbit type cycling period
[ESRO-CR[P]-504] N75-10596

NICKEL COMPOUNDS
Picosecond flash photolysis and spectroscopy: Bis-[4-dimethylaminodithiobenzil]--Ni[2], [BDN] --- transient absorption spectrum
[AD-781925] N75-10199

NICKEL OXIDES
Diffusion studies in nonmetallic system, part 1 --- formation of nickel alumina oxides
[AD-784437] N75-10246

NIGHT
Investigations on the day-night-differences of physical performance capacity
[DLR-FB-74-29] N75-10697

NIOBIUM ALLOYS
Tungsten-reinforced oxidation-resistant columbium alloys
[AD-783985] N75-10192

NITROBENZENES
The influence of self-focusing on the stimulated line of the Rayleigh wing
N75-10771

NITROGEN
N2 scattering measurements at 10.6 microns
[AD-784723] N75-10200
Nitrogen condensation in a sonic orifice expansion flow
[AD-783254] N75-10399
A study of CO2 gasdynamic lasers. Part 1: Theoretical and numerical analysis --- molecular exchange mechanisms
[CP-38] N75-10435

NITROGEN DIOXIDE
Comparability of nine methods for monitoring NO2 in ambient air
[PB-233429/0] N75-10618

NITROGEN OXIDES
Novel materials for power systems. Part 1: Schizophrenic catalysts --- oxidation of carbon monoxide and reduction of nitrogen oxides over chromium catalysts
[AD-784447] N75-10203
Calculation of NO and CO molecular spectra in the coma of a comet --- related to Kohoutek UV spectrum measurements
[MPI-PAE/EXTRATERR-98] N75-10880

NOISE GENERATORS
Fluid dynamic aspects of jet noise generation
[NASA-CR-140673] N75-10088
NOISE POLLUTION
The social cost of airport noise as measured by rental changes: The case of Logan Airport
N75-10849
NOISE PROPAGATION
Satellite X4: The 100-element self-scanned photodiode array experiment
[RAE-TR-73195] N75-10145
High speed cascade noise
[TT-7406] N75-10756
NOISE REDUCTION
Model 301 HLH/ATC [Heavy Lift Helicopter/Advanced Technology Component) transmission noise reduction program
[AD-784132] N75-10063
A computing method for sound propagation through a nonuniform jet stream
[NASA-TM-X-71941] N75-10359
Propagation of waves in elliptic ducts. A theoretical study --- in view of jet engine compressor noise reduction
[NASA-CR-140652] N75-10378
Implementation of the Noise Control Act of 1972 [aircraft-airport noise], part 2
[GPO-33-871] N75-10864
NOISE STORMS
Relation between metric and decametric noise storm sources and microwave S-component emissions
[NASA-TM-X-70764] N75-10285
NOISE TOLERANCE
A survey of aircraft noise annoyance in an area of invariant noise to eliminate the effects on annoyance of varying noise exposure
[TT-7405] N75-10755
NONDESTRUCTIVE TESTS
Electromagnetic radiation screening of microcircuits for long life applications
[NASA-CR-120512] N75-10311
Sound field intensities in liquids and solids --- nondestructive tests of sound transmission
[ARL/MET-NOTE-100] N75-10753
NONEQUILIBRIUM FLOW
Skimming of molecular beams from diverging nonequilibrium gas jets
[DLR-FB-74-28] N75-10761
Nonequilibrium statistical thermodynamics
[AD-784411] N75-10847
NONLINEAR SYSTEMS
Quadratic differential systems: A study in nonlinear systems theory
N75-10739
NONUNIFORM PLASMAS
Physical mechanism of parametric instabilities near the lower hybrid frequency in inhomogeneous plasma
[MATT-1069] N75-10801
NORMAL DENSITY FUNCTIONS
An empirical analysis of the distribution of overshoots in a stationary Gaussian stochastic process
[NASA-CR-129008] N75-10736
NORTH CAROLINA
Skylab a proposal aerotriangulation with very small scale photography --- North Carolina and Virginia
[E74-10804] N75-10532
Geographic applications of ERTS-1 imagery to landscape change --- Mississippi River and Great Smoky Mountains of Tennessee and North Carolina
[E74-10810] N75-10537
NORTHERN HEMISPHERE
Comparison of the Southern and Northern Hemisphere general circulation characteristics as determined by satellite ozone data
[UCRL-75556] N75-10638
NOSE CONES
Contribution of a wall shear stress to the Magnus effect on nose shapes
[AD-784145] N75-10400
NOZZLE DESIGN
Self-excited superturbulence: The whistler nozzle
[RE-488] N75-10363
NOZZLE FLOW
Fluid dynamic aspects of jet noise generation
[NASA-CR-140673] N75-10088
Self-excited superturbulence: The whistler nozzle
[RE-488] N75-10363
Accuracy of homogeneous nucleation rates determined in supersonic nozzles
[AD-784506] N75-10388
Analysis of chemical lasers. Volume 2: Chemical laser flow analyses
[AD-784532] N75-10450
NOZZLE GEOMETRY
Scale model testing of the jet noise characteristics of the JT8D refan engine nozzle system
[NASA-CR-134618] N75-10091
NOZZLE INSERTS
Pyrolytic graphite coated throat inserts
[AD-783849] N75-10176
NUCLEAR CHEMISTRY
Structure and properties of alloys for atomic energy
N75-10204
NUCLEAR ENERGY
Advanced nuclear research
[GPO-41-253] N75-10764
NUCLEAR FUSION
Transport and divertor studies in the FM-1 spherator
[MATT-1078] N75-10803
Trends in nuclear fusion research
[TRITA-EPP-74-12] N75-10807
Interim report on Fokker-Planck studies of two-component-tori --- with beam injection and nuclear fusion
[AD-783036] N75-10816
NUCLEAR PARTICLES
Nuclear composition of solar cosmic rays
[MPI-PAE/EXTRATERR-101] N75-10896
NUCLEAR RESEARCH
Advanced nuclear research
[GPO-41-253] N75-10764
NUCLEAR SPIN
The spin-temperature theory of dynamic nuclear polarization and nuclear spin-lattice relaxation
[NASA-TR-R-427] N75-10765
NUCLEATION
Accuracy of homogeneous nucleation rates determined in supersonic nozzles
[AD-784506] N75-10388
NUCLIDES
Multicharged particle emission in the disintegration of carbon induced by high-energy electrons --- polystyrene foil, plastic detectors
[NOTA-INTERNA-555] N75-10767
NUMERICAL ANALYSIS
One method of numerical solution of the Navier-Stokes equations for a compressible gas
[NASA-TT-F-15992] N75-10355
EUROMECH 46: Numerical and experimental investigations of the stability of boundary layers
[AD-783568] N75-10391
The two dimensional transient solution of the carrier transport equations in solid-state devices
N75-10819
A numerical study of protostellar formation --- the evolution of gravitationally bound gas clouds from the interstellar medium
N75-10874
NUMERICAL CONTROL
Numerical modeling of unsteady flow with natural and forced separation
N75-10338
NUMERICAL WEATHER FORECASTING
Modelling for the first GARP global experiment
[GARP-PUBL-14] N75-10639
Application of satellite cloud brightness data for large scale tropical analysis: A correlation study of brightness and 200-MB divergence
[AD-784366] N75-10652
Integration of equations of the dynamics of the atmosphere for solving problems in climate theory
[AD-783971] N75-10662
Recent advances in numerical weather prediction
[AD-784364] N75-10664
NYSTAGMUS
The generation of saccadic eye movements in vestibular nystagmus --- computerized simulation of nystagmic response to acceleration
[AD-784128] N75-10700

O

OAO 2
OAO 2/Wisconsin Experiment Package [WEP] photometer users guide
[NASA-TM-X-72533] N75-10410
OCEAN CURRENTS
Remote sensing of ocean current boundary layer --- Florida
[E74-10801] N75-10529
OCEAN DATA ACQUISITIONS SYSTEMS
Report of the meeting on drifting buoys for the first GARP global experiment
[GARP-SPEC-REPT-13] N75-10674
OCEAN SURFACE
A radar altimeter for satellite application
[AD-784373] N75-10425
Atmospheric response to variations in sea surface temperature
[NASA-CR-140604] N75-10672
Report of the meeting on drifting buoys for the first GARP global experiment
[GARP-SPEC-REPT-13] N75-10674
The Coho Project: Living resources prediction feasibility study. Volume 3: System evaluation report
[PB-234059/4] N75-10683
OCEANOGRAPHIC PARAMETERS
A study of lagoonal and estuarine processes in the area of Merritt Island encompassing the space center
[NASA-CR-140601] N75-10670
OCEANOGRAPHY
Interaction of marine geodesy, satellite technology and ocean physics
[NASA-CR-137470] N75-10671
NRL progress report, February 1974 --- research on the structure of matter
[PB-233883/8] N75-10749
OCEANS
Bibliography of Soviet material on internal waves, January - March 1974
[AD-782018] N75-10675
Computations of M sub 2 and K sub 1 ocean tidal perturbations in satellite elements
[NASA-CR-139124] N75-10851
OGIVES
Measurements of dynamic stability derivatives of an ogive delta wing model at transonic and supersonic speeds
[FFA-TN-AU-925] N75-10019
OHIO
Automated strip mine and reclamation mapping from ERTS --- Ohio coal
N75-10556
OIL EXPLORATION
Rivers of the past: Creators of oil
[NASA-TT-F-15974] N75-10517
An evaluation of the suitability of ERTS data for the purposes of petroleum exploration --- Anadarko Basin in Oklahoma and Texas
N75-10553
OILS
Impact of motor gasoline lead additive regulations on petroleum refineries and energy resources, 1974-1980, phase 1
[PB-234185/7] N75-10601
OKLAHOMA
An evaluation of the suitability of ERTS data for the purposes of petroleum exploration --- Anadarko Basin in Oklahoma and Texas
N75-10553
OMEGA NAVIGATION SYSTEM
Implementation of an experimental program to investigate the performance characteristics of OMEGA navigation
[NASA-CR-132516] N75-10041
ONE DIMENSIONAL FLOW
One-dimensional equations for MHD channel flows
N75-10365
OPERATIONAL PROBLEMS
Operational effectiveness of transport aircraft
[NASA-TT-F-810] N75-10036
Simulation studies of STOL airplane operations in metropolitan downtown and airport air traffic control environments
[NASA-TN-D-7740] N75-10038
OPTICAL COMMUNICATION
Development of a wideband pulse quaternary modulation system --- for an operational 400 Mbps baseband laser communication system
[NASA-CR-139129] N75-10288
Laser beam deflection --- using acousto-optical grating
[BBC-RD-1974/31] N75-10434
GaAs Large Optical Cavity [LOC] laser diode for communications receivers
[AD-784341] N75-10442
An experiment to measure the modulation transfer function of the atmosphere in the marine boundary layer
[AD-783807] N75-10792
OPTICAL DATA PROCESSING
Coherent optical filtering methods in the object and space frequency domain [experiments, theory and critical considerations for application in the fields of character reading and pattern recognition]
[BMFT-FB-T-74-08] N75-10728
Commutable functional devices of the scanistor type in systems of optoelectronic information processing
[AD-783820] N75-10789
OPTICAL EQUIPMENT
Helicopter dropsight
[AD-784551] N75-10084
Photo-optical instrumentation of flyer plate tests
[SLL-72-105] N75-10417
Gradient index optics: Aspects of design, testing, tolerancing, and fabrication
N75-10770
Opto-electronics --- application of electro-optical equipment for avionic systems
[AGARD-LS-71] N75-10774
Infrared and visible radiation detectors for imaging and non-imaging applications
N75-10777
OPTICAL FILTERS
Coherent optical filtering methods in the object and space frequency domain [experiments, theory and critical considerations for application in the fields of character reading and pattern recognition]
[BMFT-FB-T-74-08] N75-10728
OPTICAL MEASUREMENT
Atmospheric measurements program
[AD-784374] N75-10653
Statistical estimation of the light pulse deformation in the optical sounding of plane-stratified clouds
[AD-784245] N75-10654
OPTICAL PROPERTIES
Low loss window materials for chemical lasers
[AD-784326] N75-10453

Optical and Faraday studies of liquid crystals
N75-10825

OPTICAL PUMPING
Laser sources --- characteristics of various laser systems and methods for controlling laser outputs
N75-10776

OPTICAL SCANNERS
Display devices and their use in avionics systems --- factors affecting selection and performance of electro-optical sensors
N75-10778

OPTICAL WAVEGUIDES
Scattering of optical beams from slowly varying leaky wave structures
N75-10769
Optical waveguide data transmission for avionics --- analysis of materials, structures, circuits, and waveguide/terminal interface
N75-10779
Studies of spin-wave mode-locking and phonon magnon interaction and the potential use of the effects for device applications
[AD-784676] N75-10838

OPTICS
NRL progress report, February 1974 --- research on the structure of matter
[PB-233883/8] N75-10749
Applied optics research report
[AD-784229] N75-10794
Applied optics research report
[AD-784228] N75-10795

OPTIMAL CONTROL
Optimal control theory investigation of proprotor/wing response to vertical gust
[NASA-TM-X-62384] N75-10057
Optimum transient response characteristic of a VTOL aircraft with direct side force control --- jet control for optimization of VTOL aircraft flight characteristics
[DLR-FB-73-72] N75-10103

OPTIMIZATION
Unified approach to quadratically convergent algorithms for constrained function minimization
N75-10729

OREGON
Coastal upwelling ecosystems analysis. Data report 13: Radiation measurements off the Oregon coast July/August 1973
[PB-233958/8] N75-10676
Outpatient medical costs related to air pollution in the Portland, Oregon area
[EPA-600/5-74-017] N75-10692

ORGANIC MATERIALS
Theoretical performance of organic polymers in hybrid engines with hydrogen peroxide as oxidizer --- rocket propellant performance
[ESRO-TT-94] N75-10262
Problems in producing highest energy densities by organic capacitor dielectrics
[BMFT-FB-T-74-10] N75-10321
Water elution of organic matter in the northern Taiga forests of the Kola Peninsula
[NASA-TT-F-15981] N75-10519
Transformation of organic substances in soil
[NASA-TT-F-15985] N75-10521

ORGANOMETALLIC COMPOUNDS
Picosecond flash photolysis and spectroscopy: Bis-[4-dimethylaminodithiobenzil]--Ni[2], [BDN] --- transient absorption spectrum
[AD-781925] N75-10199

ORIFICE FLOW
Nitrogen condensation in a sonic orifice expansion flow
[AD-783254] N75-10399

OSCILLATING FLOW
Application of the polar coordinate method to oscillating wing configurations
[SAAB-TN-69] N75-10010

OSO-7
Data analysis support for UNH gamma ray detector on OSO-7
[NASA-CR-140597] N75-10139

OUTER PLANETS EXPLORERS
Self-sterilization of bodies during outer planet entry
[NASA-CR-140808] N75-10678
Planetary quarantine: Space research and technology
[NASA-CR-140806] N75-10707

OVERPRESSURE
Acoustic scattering from a sphere with nonuniform surface impedance --- mathematical method for computing overpressure in near and far fields
[AD-783805] N75-10757

OXIDATION
Thermal oxidation of gallium arsenide phosphide --- applied to semiconductor technology
N75-10179
Novel materials for power systems. Part 1: Schizophrenic catalysts --- oxidation of carbon monoxide and reduction of nitrogen oxides over chromium catalysts
[AD-784447] N75-10203
Surface electronic properties and the search for new hydrogen oxidation catalysts --- considering tungsten, platinum, and tungsten carbide
[SLA-73-5805] N75-10833

OXIDATION RESISTANCE
Strengthening of oxidation resistant materials for gas turbine applications --- treatment of silicon ceramics for increased flexural strength and impact resistance
[NASA-CR-134661] N75-10092
Tungsten-reinforced oxidation-resistant columbium alloys
[AD-783985] N75-10192

OXIDIZERS
Theoretical performance of organic polymers in hybrid engines with hydrogen peroxide as oxidizer --- rocket propellant performance
[ESRO-TT-94] N75-10262

OXYGEN
Report on Project Hydrox 2
[AD-784446] N75-10701

OXYGEN CONSUMPTION
Investigations on the day-night-differences of physical performance capacity
[DLR-FB-74-29] N75-10697

OXYGEN MASKS
Physiologic testing of the T-43 passenger oxygen mask
[AD-783237] N75-10711

OZONE
Transport processes and trace constituents in the stratosphere --- effects of supersonic aircraft operation on ozone distribution
[COO-2249-3] N75-10523
Comparison of the Southern and Northern Hemisphere general circulation characteristics as determined by satellite ozone data
[UCRL-75556] N75-10638

P

PADDLES
Thermal vacuum qualification test of No. 1 Hawker Siddeley Dynamics low speed mechanism --- for solar paddles
[ESRO-ESTL-3] N75-10461

PALEOMAGNETISM
Geologic and geomagnetic background noise in two areas of the North Atlantic, phase 1 --- magnetic interference arising from sea floor geology
[AD-783693] N75-10627

PARABOLIC DIFFERENTIAL EQUATIONS
Alternating-direction Galerkin methods for parabolic and hyperbolic problems on rectangular polygons
[LA-5534-MS] N75-10731

PARACHUTE DESCENT
Slow descent recovery system technology study and data program
[AD-783268] N75-10032

PARACHUTES
Wind tunnel tests of modified cross, hemisflo, and disk-gap-band parachutes with emphasis in the transonic range
[NASA-TN-D-7759] N75-10007
Flight tests of Viking parachute system in three Mach number regimes. 1: Vehicle description, test operations, and performance
[NASA-TN-D-7692] N75-10147

PARAMETRIC FREQUENCY CONVERTERS
Development and astronomical application of a high quantum efficiency infrared upconverter
[NASA-CR-140679] N75-10791

PARTIAL DIFFERENTIAL EQUATIONS
Empirical investigation of reordering and data management for finite element systems of equations
[ANL-8056] N75-10732

PARTICLE ACCELERATION
Canonical formulation of instantaneous electrodynamics, gravitation
N75-10620

PARTICLE SIZE DISTRIBUTION
The variation of solar proton energy spectra size distribution with heliolongitude
[NASA-TM-X-70770] N75-10899

PARTICLE TRAJECTORIES
Erosion in radial inflow turbines. Volume 3: Trajectories of erosive particles in radial inflow turbines
[NASA-CR-134700] N75-10087

PARTICLES
Flow of a two phase medium with solid particles around a thin profile
[AD-783571] N75-10393

PASSENGERS
An analysis of some world transport statistics
[PB-232940/7] N75-10868

PATTERN RECOGNITION
Pattern recognition relevant to reconnaissance and remote sensing --- noting classification methods
[PHL-1974-23] N75-10573
An extension of the combinatorial geometry technique for modeling vegetation and terrain features
[AD-782883] N75-10577
Coherent optical filtering methods in the object and space frequency domain [experiments, theory and critical considerations for application in the fields of character reading and pattern recognition]
[BMFT-FB-T-74-08] N75-10728
Applied optics research report
[AD-784228] N75-10795

PATTERNS
Comparisons of fracture mirrors in flint glass fractured under various loading conditions
[AD-784489] N75-10258

PCM TELEMETRY
A study on data-compression techniques
[ESRO-CR-93] N75-10717

PEELING
Removal of insulation from multiconductor wire tape using a carbon dioxide laser
[BDX-613-887-REV] N75-10437
Insulation removal from woven-wire tape --- chemical and laser stripping
[BDX-613-1067-REV] N75-10438

PEENING
An improved portable peening gun
[NASA-CASE-MFS-23047-1] N75-10459

PERFORMANCE
Performance and exit distortion of diffusers as determined by force measurements --- using laminar inlet boundary layers
N75-10361

PERFORMANCE PREDICTION
Some factors affecting the use of lighter than air systems --- economic and performance estimates for dirigibles and semi-buoyant hybrid vehicles
[NASA-TM-X-62374] N75-10004
Critical review of methods to predict the buffet capability of aircraft
[AGARD-R-623] N75-10053
Effects of ground based aircraft simulator motion conditions upon prediction of pilot proficiency, part 2
[AD-783257] N75-10115

PERFORMANCE TESTS
Endurance testing of an LM-726-4 elastomeric pitch change bearing
[AD-784140] N75-10074
Optimum rate of climb for high performance aircraft
[AD-784112] N75-10076
T and E guidelines for aircraft systems
[AD-784549] N75-10085
Performance monitor system functional simulator, environmental data, orbiter 101[HFT]
[NASA-TM-X-72028] N75-10136
Analysis and design of a fixed-wheel attitude stabilization system for a stationary satellite --- performance comparisons between systems with and without yaw sensors
[UTIAS-188] N75-10149
Parametric investigation of a linear edge colloid thruster
[ESRO-CR[P]-485] N75-10174
Testing of a flat conductor cable baseboard system for residential and commercial wiring
[NASA-TM-X-64888] N75-10313
FM laboratory measurements on the 12GHz klystron YK 1210[V42SK]
[ESRO-CR[P]-523] N75-10324
Evaluation program for secondary spacecraft cells: Initial evaluation tests of General Electric Company 12.0 ampere-hour, nickel-cadmium spacecraft cells for the international ultraviolet Explorer satellite
[NASA-CR-140672] N75-10583
Testing of NiCd cells over geostationary orbit type cycling period
[ESRO-CR[P]-504] N75-10596
Physiologic testing of the T-43 passenger oxygen mask
[AD-783237] N75-10711

PERTURBATION THEORY
Simulation of redshifts in hydrogen by perturbations
[AD-783776] N75-10881

PHASE TRANSFORMATIONS
Transition metal oxides: Crystal chemistry, phase transition and related aspects
[NSRDS-NBS-49] N75-10193
Conduction electrons and magnetism
[AD-783401] N75-10839
Statistical mechanics of one-dimensional single component Landau-Ginzburg fields
[AD-783477] N75-10848

PHOTOABSORPTION
Applications of the direct photon absorption technique for measuring bone mineral content in vivo. Determination of body composition in vivo
[NASA-CR-140708] N75-10694
Skeletal status and soft tissue composition in astronauts. Tissue and fluid changes by radionuclide absorptiometry in vivo
[NASA-CR-140689] N75-10695

PHOTOCHEMICAL REACTIONS
Chemical kinetics data survey. 5. Sixty-six contributed rate and photochemical data evaluations on ninety-four reactions
[NBSIR-73-206] N75-10180

PHOTOCONDUCTIVITY
Infrared and visible radiation detectors for imaging and non-imaging applications
N75-10777
Gallium arsenide submillimeter photoconductive detection
N75-10820

PHOTOCONDUCTORS
Some aspects of optical feedback with cadmium sulfide and related photoconductors --- for extended frequency response
[NASA-TN-D-7727] N75-10785
PHOTODIODES
Optical waveguide data transmission for avionics --- analysis of materials, structures, circuits, and waveguide/terminal interface
N75-10779
PHOTOELECTRIC EMISSION
The III-V surface studies
[AD-784342] N75-10842
PHOTOGRAMMETRY
Comparison of various methods of flight-line three-dimensional analytic phototriangulation
[AD-783662] N75-10574
Studies in stereophotogrammetry
[AD-784425] N75-10576
PHOTOGRAPHIC EQUIPMENT
Some problems of aerial photographic surveying employing color and spectrozonal photographic materials
[AD-784147] N75-10430
PHOTOGRAPHIC PROCESSING
Evaluation of Skylab imagery as an information service for investigating land use and natural resources --- Long Island, New York
[E74-10730] N75-10526
Developing processing techniques for Skylab data --- vegetation and soil identification
[E74-10799] N75-10527
PHOTOGRAPHY
Large aperture electrooptic photographic shutter
[SLA-74-101] N75-10416
Photo-optical instrumentation of flyer plate tests
[SLL-72-105] N75-10417
PHOTOINTERPRETATION
ERTS-1 imagery interpretation techniques in the Tennessee Valley --- land use and soil mapping
[E74-10811] N75-10538
PHOTOMAPPING
Overall evaluation of ERTS-1 imagery for cartographic application --- Australia, Antarctica, U.S., and U.S.S.R.
[E74-10800] N75-10528
Geographic applications of ERTS-1 imagery to landscape change --- Mississippi River and Great Smoky Mountains of Tennessee and North Carolina
[E74-10810] N75-10537
Evaluate ERTS imagery for mapping and detection of changes of snowcover on land and on glaciers --- Alaska and Washington
[E74-10812] N75-10539
Skylab-EREP investigations of wetlands ecology --- New Jersey and Chesapeake Bay
[E74-10816] N75-10542
Utilization of Skylab [EREP] system for appraising changes in continental migratory bird habitat
[E74-10817] N75-10543
Automated strip mine and reclamation mapping from ERTS --- Ohio coal
N75-10556
Land use and mapping
N75-10560
PHOTOMAPS
Mariner Mars 1971 television picture catalog. Volume 1, addendum 1: Experiment design and picture data
[NASA-CR-140700] N75-10890
PHOTOMETERS
Infrared and visible radiation detectors for imaging and non-imaging applications
N75-10777
PHOTOMULTIPLIER TUBES
A detection system with two photomultiplier units for measurement of projectile terminal velocity
[PHL-1974-22] N75-10421
PHYSICAL CHEMISTRY
Transition metal oxides: Crystal chemistry, phase transition and related aspects
[NSRDS-NBS-49] N75-10193
PHYSIOLOGICAL EFFECTS
In vivo measurement of human body composition
[NASA-CR-140668] N75-10690
PIEZOELECTRIC TRANSDUCERS
Ultrasonic absorption by phospholipid vesicles; acoustic impedance matching and the design of broadband piezoelectric transducers
N75-10751
PIEZOELECTRICITY
Piezoelectric traveling wave amplifiers --- based on surface shear waves
[BMFT-FB-T-74-05] N75-10318
PILOT PERFORMANCE
Effects of ground-based aircraft simulator motion conditions upon prediction of pilot proficiency, part 1
[AD-783256] N75-10112
PILOT TRAINING
Effects of ground based aircraft simulator motion conditions upon prediction of pilot proficiency, part 2
[AD-783257] N75-10115
PIONEER 10 SPACE PROBE
Pioneer odyssey: Encounter with a giant
[NASA-SP-349] N75-10130
Pioneer 10: Observations of energetic electrons in the Jovian magnetosphere
[NASA-CR-140676] N75-10888
PIONEER 11 SPACE PROBE
Pioneer 11 Jupiter encounter
[NASA-NEWS-RELEASE-74-292] N75-10123
PIPE FLOW
The prediction of turbulent confined jet mixing with and without swirl
N75-10345
PISTONS
Aerospace Research
[ESRO-TT-40] N75-10367
Piston unit for rate modulation of a liquid flow --- in liquid propellant transfer noting POGO effect
N75-10372
PITCHING MOMENTS
Low-speed wing-tunnel measurements of the lift, drag and pitching moment of a series of cropped delta wings
[ARC-R/M-3744] N75-10030
PLANAR STRUCTURES
Scattering of optical beams from slowly varying leaky wave structures
N75-10769
PLANETARY ATMOSPHERES
Self-sterilization of bodies during outer planet entry
[NASA-CR-140808] N75-10678
Consideration of probability of bacterial growth for Jovian planets and their satellites
[NASA-CR-140807] N75-10712
Pioneer 10: Observations of energetic electrons in the Jovian magnetosphere
[NASA-CR-140676] N75-10888
PLANETARY MAGNETIC FIELDS
Is Jupiter's magnetosphere like a pulsar's or earth's?
[NASA-CR-140600] N75-10889
PLANETARY RADIATION
Is Jupiter's magnetosphere like a pulsar's or earth's?
[NASA-CR-140600] N75-10889
PLANTS [BOTANY]
A study to explore the use of orbital remote sensing to determine native arid plant distribution --- Arizona Regional Ecological Test Site
[E74-10818] N75-10544
Problems of space biology. Volume 27: Radiobiology and genetics of arabidopsis --- effects of radiation and weightlessness
[NASA-TT-F-15849] N75-10679
PLASMA ACCELERATORS
Calculation of inductive plasma accelerators with sinusoidal electromagnetic standing waves for continuous energy supply
[ESRO-TT-76] N75-10809
PLASMA CONTROL
Trends in nuclear fusion research
[TRITA-EPP-74-12] N75-10807
PLASMA DECAY
Physical mechanism of parametric instabilities near the lower hybrid frequency in inhomogeneous plasma
[MATT-1069] N75-10801
PLASMA DIAGNOSTICS
Low-frequency instabilities and plasma turbulence --- steady state and time dependent characteristics of positive column and hollow cathode discharge
N75-10797
Experimental and computational study of the low-density plasma in the outer regions of a theta pinch
[LRP-85/74] N75-10808
Conical electrostatic probe response in a weakly ionized gas flow --- for measuring ion density
[AD-783261] N75-10815
PLASMA DYNAMICS
The electronics of the plasma drift experiment S 329 in the GEOS satellite
[MPI-PAE/TB-EXTRATERR-10] N75-10320
PLASMA ENGINES
On power conditioning for satellite stabilisation thrusters
[RAE-LIB-TRANS-1771] N75-10158
PLASMA GENERATORS
The effects of impurities and magnetic divertors on high-temperature tokamaks
[MATT-1079] N75-10804
PLASMA HEATING
Transport and divertor studies in the FM-1 spherator
[MATT-1078] N75-10803
Two-energy component toroidal fusion devices
[MATT-1088] N75-10805
PLASMA OSCILLATIONS
Linear parametric instabilities at high pump powers
[AD-783780] N75-10814
PLASMA PHYSICS
Interim report on Fokker-Planck studies of two-component-tori --- with beam injection and nuclear fusion
[AD-783036] N75-10816
PLASMA POTENTIALS
Study on properties of nonisothermal ion accelerator
[AD-782052] N75-10810
PLASMA POWER SOURCES
Calculation of inductive plasma accelerators with sinusoidal electromagnetic standing waves for continuous energy supply
[ESRO-TT-76] N75-10809
PLASMA RADIATION
Radiation from plasmas in the ST Tokamak
[MATT-1077] N75-10802
PLASMA TURBULENCE
Low-frequency instabilities and plasma turbulence --- steady state and time dependent characteristics of positive column and hollow cathode discharge
N75-10797
Turbulent magnetic fields in a collision dominated plasma
[PSU-IRL-SCI-432] N75-10800
PLASMAS [PHYSICS]
Research in solid state, plasmas, electrical and biomedical engineering
[AD-784655] N75-10750
Ion heating in a plasma focus
[NASA-TN-D-7765] N75-10798
Holographic interferometry developments for dense plasmas
[AD-783511] N75-10813
PLASTIC PROPERTIES
Superplasticity of steel KH18N10T
[AD-784175] N75-10245
Extremal boundary value problems in the theory of plasticity
[AD-784172] N75-10513
Mechanics of a deformed solid
[AD-784209] N75-10514
PLASTICS
Recycling of plastics from urban and industrial refuse
[BM-RI-7955] N75-10267
Mechanical deburring of plastics
[BDX-613-988-REV] N75-10270
PLATELETS
Measurement of platelet aggregation in flowing blood with the use of a filter --- filter-loop technique and filtragometer
N75-10699
PLATES [STRUCTURAL MEMBERS]
Plane strain fracture toughness testing on center-cracked plates under uniform tension --- mild steels and polymethyl methacrylate
[CRIF-MT-91] N75-10500
PLATINUM ALLOYS
Influence of thermomechanical treatment on the tensile properties of a platinum 25 wt percent iridium alloy
[UCRL-75630] N75-10229
Low temperature thermophysical and mechanical properties of high purity platinum-25 w/o iridium alloy
[UCRL-75278] N75-10230
PLOTTERS
Using the OCS complot DP-1 plotter
[NASA-CR-140602] N75-10722
PLUMES
Dynamics of suspended sediment plumes in Lake Ontario
[E74-10815] N75-10541
POGO EFFECTS
Aerospace Research
[ESRO-TT-40] N75-10367
Piston unit for rate modulation of a liquid flow --- in liquid propellant transfer noting POGO effect
N75-10372
POINTING CONTROL SYSTEMS
Precision Pointing Control System [PPCS] system design and analysis --- for gimbaled experiment platforms
[NASA-CR-139132] N75-10157
POLAR ORBITS
Satellite operations plan
N75-10635
POLARIZATION [SPIN ALIGNMENT]
The spin-temperature theory of dynamic nuclear polarization and nuclear spin-lattice relaxation
[NASA-TR-R-427] N75-10765
POLARIZATION [WAVES]
A study of a dual polarization laser backscatter system for remote identification and measurement of water pollution
[NASA-CR-140665] N75-10563
POLARIZED RADIATION
Polarization of radar signals
[AD-783761] N75-10303
POLLUTION CONTROL
An air pollution control system
N75-10615
New motor vehicle emission standards and fuel economy
[GPO-29-272] N75-10863
POLLUTION MONITORING
A study of a dual polarization laser backscatter system for remote identification and measurement of water pollution
[NASA-CR-140665] N75-10563
Application of remote sensing for prediction and detection of thermal pollution
[NASA-CR-139182] N75-10572

Comparability of nine methods for monitoring NO2 in ambient air
[PB-233429/0] N75-10618

POLYESTERS
Insulation removal from woven-wire tape --- chemical and laser stripping
[BDX-613-1067-REV] N75-10438

POLYGONS
Alternating-direction Galerkin methods for parabolic and hyperbolic problems on rectangular polygons
[LA-5534-MS] N75-10731

POLYIMIDES
Effect of water on the properties of a glass-polyimide laminate --- accelerated hydrolytic aging
[RM-589] N75-10186

POLYMERIZATION
Carbon-fiber-reinforced polymers and their thermal decomposition to carbon-carbon composities
[NASA-TT-F-15990] N75-10252

POLYMERS
Research on varied properties of metals, ceramics, polymers, and alloys
[AD-783964] N75-10185

POLYMETHYL METHACRYLATE
Plane strain fracture toughness testing on center-cracked plates under uniform tension --- mild steels and polymethyl methacrylate
[CRIF-MT-91] N75-10500

POROUS MATERIALS
Heat transport in porous insulations at cryogenic temperatures
N75-10339

PORTABLE EQUIPMENT
An improved portable peening gun
[NASA-CASE-MFS-23047-1] N75-10459

POSITION [LOCATION]
Comments on observations with very long baseline radio interferometers for position determination
N75-10419
Real-time cinetheodolite data system [RTCDS] for Yuma Proving Ground
[AD-781969] N75-10426
Proceedings of the Waldorf Conference on Long Range Geographic Estimation of Lightning Sources
[AD-784393] N75-10624
The dependence of reaction times on the location of the stimulus
[NASA-TT-F-16001] N75-10689

POSITRONIUM
Orthopositronium annihilation in liquid and solid helium
N75-10762

POSTFLIGHT ANALYSIS
MSFC Skylab corollary experiment systems mission evaluation
[NASA-TM-X-64820] N75-10121
Retention and application of Skylab experiences to future programs --- a postflight review of technical programs
[NASA-TM-X-64853] N75-10126

POTASSIUM COMPOUNDS
Preliminary design of a Primary Loop Pump Assembly [PLPA], using electromagnetic pumps
[NASA-CR-140713] N75-10458

POTENTIAL FIELDS
Surface structure and applied stress in corrosion rate
[AD-783402] N75-10247

POTENTIOMETERS [RESISTORS]
Present-day status of accelerated testing of trimming potentiometers
[ESRO-CR-167] N75-10472

POWER SUPPLIES
NSF-Rann energy abstracts: A monthly abstract journal of energy research
[ORNL-EIS-74-52-VOL-2-NO-1]
N75-10592

PRECIPITATION [METEOROLOGY]
Fine structure precipitation effects and possible remedial techniques on 15 GHz line-of-sight radio links
[AD-784096] N75-10305
Geographic applications of ERTS-1 imagery to landscape change --- Mississippi River and Great Smoky Mountains of Tennessee and North Carolina
[E74-10810] N75-10537
Mean precipitation-hours for the conterminous United States
[NC-98] N75-10629
Some statistical analyses of Hawaiian rainfall
[PB-233674/1] N75-10656
Jemez atmospheric water resources research project, Volume 1: Summary and accomplishments --- cloud seeding evaluation
[PB-234005/7] N75-10657
Jemez atmospheric water resources research project. Volume 2: Special aspects of the program
[PB-234006/5] N75-10658

PRECISION
Precision in LCHTF testing --- of aircraft jet engines
N75-10490

PREDICTION ANALYSIS TECHNIQUES
Lifetime prediction methods for elevated temperature fatigue --- in aircraft jet engines
N75-10493
Application of remote sensing for prediction and detection of thermal pollution
[NASA-CR-139182] N75-10572
MEGASTAR: The Meaning of Energy Growth: An Assessment of Systems, Technologies, and Requirements
[NASA-CR-120355] N75-10584

PRESSURE BREATHING
Report on Project Hydrox 2
[AD-784446] N75-10701

PRESSURE DISTRIBUTION
Pressure distribution on two wings with curved leading edges at supersonic speeds
[ARC-R/M-3741] N75-10028
Effects of air breathing engine plumes on SSV orbiter subsonic wing pressure distribution, volume 2
[NASA-CR-134417] N75-10153
NAHAMMER: A computer program for analysis of one-dimensional pressure pulse propagation in a closed fluid system
[ANL-8059] N75-10350

PRESSURE EFFECTS
Experimental determination of hydrodynamic mass effects
[AD-781910] N75-10389

PRESSURE GRADIENTS
A study of the effect of pressure gradient on the eddy viscosity and mixing length for incompressible equilibrium turbulent boundary layers
[AD-783942] N75-10392

PRESSURE MEASUREMENTS
Pressure and heat flux results from the space shuttle/external fuel tank interaction test at Mach numbers 16 and 19
[NASA-CR-134418] N75-10154
Experimental determination of hydrodynamic mass effects
[AD-781910] N75-10389

PRESSURE PULSES
NAHAMMER: A computer program for analysis of one-dimensional pressure pulse propagation in a closed fluid system
[ANL-8059] N75-10350

PRESSURE RECOVERY
Experimental determination of the pressure recovery coefficients in conical diffusors at large subsonic velocities under various inlet conditions
[NASA-TT-F-15991] N75-10354

PRESSURE SENSORS
An improved static pressure probe
[NASA-CASE-LAR-11552-1] N75-10412

PRIMARY BATTERIES
Sealed primary lithium-inorganic electrolyte cell
[AD-782819] N75-10607

PROBABILITY THEORY
Theoretical principles of statistical radiotechnology, book 1 --- using probability theory
N75-10276
Optimal confidence intervals for the standard deviation of a normal distribution
[ARL/SM-NOTE-406] N75-10737

PRODUCT DEVELOPMENT
Automated scheduling of manufacturing resources
[BDX-613-1077] N75-10269
Technologic and related trends in the mineral industries, 1973
[PB-233997/6] N75-10271
Heat pipe manufacturing study
[NASA-CR-139140] N75-10347

PRODUCTION ENGINEERING
Electroslag remelting
[JPRS-63220] N75-10212
Electroslag remelting during production of sheet steel
N75-10215
Electroslag smelting of large-size hollow billets
N75-10219
Evaluation of pre-bond etchants in hybrid microcircuit processing
[SLA-73-1049] N75-10316
Heat pipe manufacturing study
[NASA-CR-139140] N75-10347
Production engineering measure for thin film ratiometer
[AD-782236] N75-10423
Profitability analysis of producing crude oil by waterflooding using a simulation technique --- computer estimated costs of water injection technique
[BM-IC-8652] N75-10582
Economy in design operations --- concering the development of technological products
[JPRS-63034] N75-10856

PRODUCTION MANAGEMENT
Automated scheduling of manufacturing resources
[BDX-613-1077] N75-10269

PROGRAMMING LANGUAGES
Set theoretic approach to data type extension
[LA-UR-73-1287] N75-10726

PROJECT MANAGEMENT
Spacelab program requirements, level 1
[NASA-TM-X-72031] N75-10137
Operations support plan
N75-10636

PROJECTILES
A detection system with two photomultiplier units for measurement of projectile terminal velocity
[PHL-1974-22] N75-10421

PROPANE
Study of the attitude and orbital control propulsion subsystem for the IME-D project --- interplanetary monitoring explorer daughter propellant evaluation
[T[F]S/033] N75-10175

PROPELLANT BINDERS
About the use of lithium-containing propellants in rocket propulsion units with FLOX as oxidizer. Part 1: Parameter study --- with hydrocarbon binders
[ESRO-TT-87] N75-10263

PROPELLANT GRAINS
Asymmetric grain evaluation computer program --- for solid rocket propellant
[AD-784350] N75-10264

PROPELLANT TRANSFER
Aerospace Research
[ESRO-TT-40] N75-10367
Piston unit for rate modulation of a liquid flow --- in liquid propellant transfer noting POGO effect
N75-10372

PROPELLER BLADES
Lifting surface theory applied to fixed wings and propellers
N75-10016

PROPHYLAXIS
Motion sickness
[NASA-TT-F-15864] N75-10685
Oral and respiratory immunization
[MBL-1974-4] N75-10698

PROPORTIONAL COUNTERS
Application of the classical theory of electrons in gases to multiwire proportional and drift chambers
[LBL-3013] N75-10828

PROPULSION SYSTEM CONFIGURATIONS
Space shuttle orbit maneuvering engine reusable thrust chamber program
[NASA-CR-140321] N75-10167
Study of the attitude and orbital control propulsion subsystem for the IME-D project --- interplanetary monitoring explorer daughter propellant evaluation
[T[F]S/033] N75-10175

PROPULSION SYSTEM PERFORMANCE
Experience with the NRC 10 feet by 20 feet V/STOL propulsion tunnel: Some practical aspects of V/STOL engine model testing
[DME/NAE-1973[2]] N75-10107
Study of the attitude and orbital control propulsion subsystem for the IME-D project --- interplanetary monitoring explorer daughter propellant evaluation
[T[F]S/033] N75-10175
Low cycle high temperature fatigue --- in aircraft jet engines: conference proceedings
[AGARD-CP-155] N75-10487
Problems of low cycle high temperature fatigue in aircraft jet engines
N75-10488
Precision in LCHTF testing --- of aircraft jet engines
N75-10490
The effect of cycle parameters on high temperature low cycle fatigue --- in aircraft jet engines
N75-10491
Design procedures for elevated temperature low-cycle fatigue --- as applied to aircraft jet engines
N75-10494

PROPULSIVE EFFICIENCY
Parametric investigation of a linear edge colloid thruster
[ESRO-CR[P]-485] N75-10174

PROTECTIVE COATINGS
High-temperature coatings on graphite
[AD-783567] N75-10463
Coatings for protecting metals under high-temperature heating and deformation
[AD-783566] N75-10465
Protective coatings from refractory compounds on metals and graphite
[AD-783923] N75-10466
Parameters governing the erosion resistance of coating substrate systems
[AD-784496] N75-10467

PROTONS
Novel materials for power systems. Part 2: Investigations of proton semi-conducting glasses
[AD-784448] N75-10257

PROTOSTARS
A numerical study of protostellar formation --- the evolution of gravitationally bound gas clouds from the interstellar medium
N75-10874

PROTOTYPES
Critical analyses and laboratory research work at the stage of aircraft preliminary design
[NASA-TT-F-15996] N75-10055

PROUSTITE
An experimental determination of long wavelength phonons and anomalous dielectric behavior in proustite and pyrargyrite
[AD-784309] N75-10841

PSYCHOPHYSICS
Applied optics research report
[AD-784229] N75-10794

PUBLIC HEALTH
Outpatient medical costs related to air pollution in the Portland, Oregon area
[EPA-600/5-74-017] N75-10692
PULMONARY LESIONS
High altitude pulmonary edema
[AD-782240] N75-10702
PULSARS
Is Jupiter's magnetosphere like a pulsar's or earth's?
[NASA-CR-140600] N75-10889
PULSE CODE MODULATION
The J-code: A minimum peak distortion code
[AD-783949] N75-10296
PULSE GENERATORS
Chemical to electromagnetic energy conversion techniques --- explosive flux compression technology
[AD-783901] N75-10609
PULSE MODULATION
Development of a wideband pulse quaternary modulation system --- for an operational 400 Mbps baseband laser communication system
[NASA-CR-139129] N75-10288
PULSED LASERS
Statistical estimation of the light pulse deformation in the optical sounding of plane-stratified clouds
[AD-784245] N75-10654
PYRENES
Quantitative determination of benzo/a/pyrene in tar-containing drugs by an isotope dilution method
[NASA-TT-F-15983] N75-10194
PYROLYSIS
An experimental study of the thermal decomposition of an ablative material
N75-10015
Carbon-fiber-reinforced polymers and their thermal decomposition to carbon-carbon composities
[NASA-TT-F-15990] N75-10252
PYROLYTIC GRAPHITE
Pyrolytic graphite coated throat inserts
[AD-783849] N75-10176

Q

QUADRATIC EQUATIONS
Unified approach to quadratically convergent algorithms for constrained function minimization
N75-10729
Quadratic differential systems: A study in nonlinear systems theory
N75-10739
QUANTITATIVE ANALYSIS
Quantitative determination of benzo/a/pyrene in tar-containing drugs by an isotope dilution method
[NASA-TT-F-15983] N75-10194
Quantitative analysis of the influence of contaminants on thermocompression bonding of gold
[SLA-73-1099] N75-10228
Quantitative determination of stratospheric aerosol characteristics
[E74-10808] N75-10535
Applications of the direct photon absorption technique for measuring bone mineral content in vivo. Determination of body composition in vivo
[NASA-CR-140708] N75-10694
Skeletal status and soft tissue composition in astronauts. Tissue and fluid changes by radionuclide absorptiometry in vivo
[NASA-CR-140689] N75-10695
QUANTUM ELECTRODYNAMICS
Canonical formulation of instantaneous electrodynamics, gravitation
N75-10620
QUANTUM STATISTICS
Statistical mechanics of one-dimensional single component Landau-Ginzburg fields
[AD-783477] N75-10848
QUASARS
Emission and absorption lines of QSOs and properties of the gas that produces them
N75-10763

R

RADAR
EMC test plan for shipboard in-harbor and at-sea measurements for L-band terminal
[NASA-CR-139130] N75-10286
NRL progress report, January 1974
[PB-233882/0] N75-10748
RADAR APPROACH CONTROL
Automatic flying of curved approach paths: A computer and flight investigation
[RAE-TR-75154] N75-10043
RADAR BEACONS
Diode beacon techniques
[AD-783619] N75-10045
RADAR ECHOES
Aircraft-velocity measurement through radar-altimeter echo with noncoherent detection
[SLA-74-112] N75-10290
Target identification by means of low frequency radar returns
[AD-783224] N75-10293
RADAR EQUIPMENT
Simultaneous dual-band radar development
[NASA-CR-140303] N75-10283
The 8-18 GHz radar spectrometer
[NASA-CR-140317] N75-10411
RADAR RECEIVERS
Vehicular variable-parameter METRRA system --- performance of radar system for clutter rejection using third harmonic return of reflected radiation
[AD-782214] N75-10295
RADAR RECEPTION
Vehicular variable-parameter METRRA system --- performance of radar system for clutter rejection using third harmonic return of reflected radiation
[AD-782214] N75-10295
RADAR SCATTERING
S-193 scatterometer transfer function analysis for data processing
[NASA-CR-140314] N75-10569
RADAR TARGETS
Vehicular variable-parameter METRRA system --- performance of radar system for clutter rejection using third harmonic return of reflected radiation
[AD-782214] N75-10295
RADAR TRACKING
Digital modeling in statistical radio engineering
[AD-783732] N75-10294
Physical and dynamical studies of meteors --- radar observation of fragmentation
[NASA-CR-132534] N75-10891
RADAR TRANSMISSION
Polarization of radar signals
[AD-783761] N75-10303
Bistatic radar sea state monitoring
[NASA-CR-137469] N75-10673
RADIAL FLOW
Erosion in radial inflow turbines. Volume 3: Trajectories of erosive particles in radial inflow turbines
[NASA-CR-134700] N75-10087
RADIANT HEATING
Solar energy trap
[NASA-CASE-MFS-22744-1] N75-10586
RADIATION BELTS
Pioneer 10: Observations of energetic electrons in the Jovian magnetosphere
[NASA-CR-140676] N75-10888
RADIATION DAMAGE
Radiation damage in metal-semiconductor tunnel junctions
N75-10826
Control of electrostatic damage to solid state devices
[BDX-613-1080] N75-10830
RADIATION DETECTORS
Data analysis support for UNH gamma ray detector on OSO-7
[NASA-CR-140597] N75-10139
The composition of cosmic rays with Z greater than or equal to 12 --- detected during high altitude balloon flight
N75-10897
RADIATION EFFECTS
Crystals and radiation: New horizons in the search for scientific knowledge
[AD-784721] N75-10201
RADIATION HAZARDS
Foil activation analysis and thermoluminescent dosimetry on Skylab 2 --- for monitoring radiation levels
[AD-783779] N75-10704
RADIATION MEASUREMENT
Coastal upwelling ecosystems analysis. Data report 13: Radiation measurements off the Oregon coast July/August 1973
[PB-233958/8] N75-10676
RADIATION SOURCES
Is Jupiter's magnetosphere like a pulsar's or earth's?
[NASA-CR-140600] N75-10889
RADIO ALTIMETERS
Aircraft-velocity measurement through radar-altimeter echo with noncoherent detection
[SLA-74-112] N75-10290
A radar altimeter for satellite application
[AD-784373] N75-10425
RADIO ASTRONOMY
Infrared, radio, and X-ray observations of Cygnus X-3
[NASA-CR-140680] N75-10882
RADIO BURSTS
Relation between metric and decametric noise storm sources and microwave S-component emissions
[NASA-TM-X-70764] N75-10285
RADIO COMMUNICATION
Radio-electronics and space
[AD-783968] N75-10299
Fine structure precipitation effects and possible remedial techniques on 15 GHz line-of-sight radio links
[AD-784096] N75-10305
RADIO CONTROL
A technique for displaying flight information in the field of view of binoculars for use by the pilots of radio controlled models
[NASA-TM-X-72015] N75-10786
RADIO ELECTRONICS
Theoretical principles of statistical radiotechnology, book 1 --- using probability theory
N75-10276
RADIO FREQUENCIES
Digital display of characteristic parameters of active radio frequency transmission systems
[AD-783806] N75-10302
RADIO FREQUENCY HEATING
Physical mechanism of parametric instabilities near the lower hybrid frequency in inhomogeneous plasma
[MATT-1069] N75-10801
RADIO FREQUENCY INTERFERENCE
Interference with aircraft radio navigation and communications by precipitation static from ice and snow clouds: Electrostatic wind tunnel experiments
[AD-784623] N75-10046
Major RFI conditions effecting TDRSS
[NASA-CR-139135] N75-10281
The effect of radio frequency interference on the 136- to 138-MHz return link and 400.5- to 401.5-MHz forward link of the Tracking and Data Relay Satellite System
[NASA-CR-139136] N75-10282
EMC test plan for shipboard in-harbor and at-sea measurements for L-band terminal
[NASA-CR-139130] N75-10286
Preliminary assessment of RFI impacts on TDRSS in the 2- to 2.3 GHz band
[NASA-CR-139125] N75-10287
RADIO INTERFEROMETERS
Comments on observations with very long baseline radio interferometers for position determination
N75-10419
RADIO NAVIGATION
Interference with aircraft radio navigation and communications by precipitation static from ice and snow clouds: Electrostatic wind tunnel experiments
[AD-784623] N75-10046
RADIO SIGNALS
Multipath compensation of a DQPSK communication link
N75-10277
Digital modeling in statistical radio engineering
[AD-783732] N75-10294
RADIO TRANSMISSION
Propagation effects at radio frequencies on satellite navigation systems --- atmospheric effects on radio transmission
[AD-784378] N75-10747
RADIOBIOLOGY
Problems of space biology. Volume 27: Radiobiology and genetics of arabidopsis --- effects of radiation and weightlessness
[NASA-TT-F-15849] N75-10679
RADIOGRAPHY
A simple method for the generation of organ and vessel contours from roentgenographic or fluoroscopic images
[NASA-CR-140685] N75-10693
RAMAN LASERS
Summary of the Laser Raman Workshop on the measurement of gas properties
[AD-782562] N75-10390
RAMAN SPECTRA
An experimental determination of long wavelength phonons and anomalous dielectric behavior in proustite and pyrargyrite
[AD-784309] N75-10841
RAMAN SPECTROSCOPY
Laser Raman spectroscopy of solutes dissolved in water from a remote platform
[PB-233432/4] N75-10202
RANGE ERRORS
Implementation of an experimental program to investigate the performance characteristics of OMEGA navigation
[NASA-CR-132516] N75-10041
RANGE RESOURCES
Agriculture, forestry, range resources
N75-10558
RANGEFINDING
Orbit determination for deep space missions by means of Doppler and ranging
[ESRO-TT-80] N75-10146
RANK TESTS
Investigation of rank 2 and higher output feedback for pole placement
[NASA-TM-X-62385] N75-10741
RAREFIED GAS DYNAMICS
Interplanetary space-A new laboratory for rarefied gas dynamics
[NASA-TM-X-72050] N75-10125
A model for gas-surface distribution functions
[RM-591] N75-10829
RATIOMETERS
Production engineering measure for thin film ratiometer
[AD-782236] N75-10423

RATS
The effects of lunar cycles and diurnal rhythms on activity, exploration, and elicited aggression in rats and mice
N75-10677

RAY TRACING
Quasi-optical methods for waveguides and resonators
N75-10768
Gradient index optics: Aspects of design, testing, tolerancing, and fabrication
N75-10770

RAYLEIGH DISTRIBUTION
The influence of self-focusing on the stimulated line of the Rayleigh wing
N75-10771

RAYLEIGH SCATTERING
N2 scattering measurements at 10.6 microns
[AD-784723] N75-10200

REACTION KINETICS
Chemical kinetics data survey. 5. Sixty-six contributed rate and photochemical data evaluations on ninety-four reactions
[NBSIR-73-206] N75-10180
Heat resistant coatings obtained by chemical deposition from solutions
[AD-783981] N75-10183
Lasers in chemistry
[AD-783049] N75-10454

REACTION TIME
The dependence of reaction times on the location of the stimulus
[NASA-TT-F-16001] N75-10689

REACTION WHEELS
Design and development of a momentum wheel with a mainly passive magnetic bearing. Volume 1: Design report, phase 1
[ESRO-CR[P]-505-VOL-1] N75-10161

REAL TIME OPERATION
Real-time simulation of the TF30-P-3 turbofan engine using a hybrid computer
[NASA-TM-X-3106] N75-10095
Real-time measuring procedure and measuring equipment for recording the radiation patterns of aircraft antennas in flight
[ESRO-TT-74] N75-10292
Triad computer
[AD-784372] N75-10718

RECEIVERS
Implementation of an experimental program to investigate the performance characteristics of OMEGA navigation
[NASA-CR-132516] N75-10041
GaAs Large Optical Cavity [LOC] laser diode for communications receivers
[AD-784341] N75-10442

RECLAMATION
Automated strip mine and reclamation mapping from ERTS --- Ohio coal
N75-10556

RECRYSTALLIZATION
Research on synthesis of high-strength aluminum alloys. Part 2: Control of grain structure during hot working
[AD-783353] N75-10239

RECTANGULAR PLATES
Free and forced vibration of rectangular plate with damping and arbitrary boundary conditions
N75-10481

RECTIFICATION
Functioning of power rectifiers and thyristors from 1 January 1970 to 31 December 1972 --- noting carrier injection, emitter shorts, ignition, and breakdown
[BMFT-FB-T-74-07] N75-10319

RECYCLING
Recycling of plastics from urban and industrial refuse
[BM-RI-7955] N75-10267

RED SHIFT
Simulation of redshifts in hydrogen by perturbations
[AD-783776] N75-10881

REENTRY PHYSICS
An experimental study of the thermal decomposition of an ablative material
N75-10015

REENTRY VEHICLES
Thermal-structural evaluation of TD Ni-20Cr thermal protection system panels
[NASA-CR-132487] N75-10155
Influence of the viscous interaction parameter on the aerodynamic coefficients and on the heat transfer of a reentry body at very low densities for the whole region of angle of attack
[ESRO-TT-95] N75-10387

REFINING
Classification and bases of mathematical description of metallurgical processes of refining liquid metal
N75-10224
Impact of motor gasoline lead additive regulations on petroleum refineries and energy resources, 1974-1980, phase 1
[PB-234185/7] N75-10601
National Crude Oil Refinery Development Act, part 2
[GPO-35-578] N75-10860
The National Coal Conversion Act and the National Crude Oil Refinery Development Act
[GPO-28-964] N75-10861

REFRACTORY METAL ALLOYS
Interdiffusion behavior of tungsten or rhenium and group 5 and 6 elements and alloys of the periodic table. Part 2A: Appendices A-G
[NASA-CR-134526] N75-10209
Thermodynamics of chemical species important to rocket technology
[AD-782028] N75-10238

REFRACTORY METALS
Protective coatings from refractory compounds on metals and graphite
[AD-783923] N75-10466

REGENERATIVE COOLING
Heat transfer investigations of a regeneratively cooled, 1 kN thrust, fluorine/ammonia engine
[ESRO-TT-93] N75-10173

REGRESSION ANALYSIS
Computer program for nonlinear regression using least squares
[BM-IC-8649] N75-10720

REINFORCED PLASTICS
An experimental study of the thermal decomposition of an ablative material
N75-10015

REINFORCED SHELLS
Analysis of a shallow spherical shell containing an asymmetrically located ring stiffened circular hole subjected to an arbitrarily located concentrated load
[AD-783351] N75-10511

REINFORCEMENT RINGS
Analysis of a shallow spherical shell containing an asymmetrically located ring stiffened circular hole subjected to an arbitrarily located concentrated load
[AD-783351] N75-10511

REINFORCING FIBERS
Carbon-fiber-reinforced polymers and their thermal decomposition to carbon-carbon composities
[NASA-TT-F-15990] N75-10252
Tensile properties of an ultrahigh-strength graphite fiber in an epoxy matrix
[UCRL-75209] N75-10253

RELAXATION TIME
Mechanical oscillator in a luminous flux
[AD-783760] N75-10796

RELAY SATELLITES
The effect of radio frequency interference on the 136- to 138-MHz return link and 400.5- to 401.5-MHz forward link of the Tracking and Data Relay Satellite System
[NASA-CR-139136] N75-10282
TDRSS data handling and management system study. Ground station systems for data handling and relay satellite control
[NASA-CR-139128] N75-10289

RELIABILITY ANALYSIS
Reliability of laboratory tests of VSTOL and other long duration noises
[NASA-CR-2471] N75-10093

RELIABILITY ENGINEERING
Interservice utility helicopter reliability and maintainability comparative analysis
[AD-784177] N75-10080
Physiologic testing of the T-43 passenger oxygen mask
[AD-783237] N75-10711

REMOTE CONSOLES
CRYSNET: A network of intelligent remote graphics terminals
[BNL-18772] N75-10716

REMOTE CONTROL
Causes for the occurrence of pulsed interference in remote-control connection circuits
[AD-783917] N75-10333
Real time digital control of remote tracking instruments --- tracking radar
[SLA-74-5186] N75-10418
Principle and realization of aeronautical laser systems --- characteristics and applications of laser systems for military purposes
N75-10782

REMOTE SENSORS
A radar altimeter for satellite application
[AD-784373] N75-10425
A study of a dual polarization laser backscatter system for remote identification and measurement of water pollution
[NASA-CR-140665] N75-10563
The application of remote sensing techniques: Technical and methodological issues
[NASA-CR-140674] N75-10564
Remote sensing applications in marine science programs at VIMS
[NASA-CR-137475] N75-10566
A survey for the use of remote sensing in the Chesapeake Bay region
[NASA-CR-137476] N75-10571
Application of remote sensing for prediction and detection of thermal pollution
[NASA-CR-139182] N75-10572
Pattern recognition relevant to reconnaissance and remote sensing --- noting classification methods
[PHL-1974-23] N75-10573
The Coho Project: Living resources prediction feasibility study, volume 1 --- meteorological forecasting of fish concentrations
[PB-234057/8] N75-10681
The Coho Project: Living resources prediction feasibility study. Volume 2: Environmental report
[PB-234058/6] N75-10682
The Coho Project: Living resources prediction feasibility study. Volume 3: System evaluation report
[PB-234059/4] N75-10683
Passive infrared systems --- effects of atmosphere on imaging techniques and sensor design
N75-10784

REMOTELY PILOTED VEHICLES
A study of stabilization techniques for small, fixed-wing, remotely piloted aircraft
[AD-784109] N75-10079

RESEARCH AND DEVELOPMENT
Energy transportation, distribution, and storage
[WASH-1281-4] N75-10595
Trends in nuclear fusion research
[TRITA-EPP-74-12] N75-10807

RESEARCH MANAGEMENT
Rationale for setting priorities for new energy technology research and development
[UCRL-51511] N75-10594

RESEARCH PROJECTS
An inlet analysis for the NASA hypersonic research engine aerothermodynamic integration model
[NASA-TM-X-3038] N75-10348
Earthquakes
[GPO-28-577] N75-10516
Research highlights 1974 fiscal
[PUBL-84/7M] N75-10522
Atmospheric and climatological research progress
N75-10632
Jemez atmospheric water resources research project. Volume 2: Special aspects of the program
[PB-234006/5] N75-10658
A review of the toxicology research program of the 6570th Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio
[AD-782249] N75-10703
The 1974 NASA-ASEE summer faculty fellowship aeronautics and space research program
[NASA-CR-120336] N75-10745
NRL progress report, January 1974
[PB-233882/0] N75-10748
NRL progress report, February 1974 --- research on the structure of matter
[PB-233883/8] N75-10749
Applied optics research report
[AD-784229] N75-10794

RESIDENTIAL AREAS
The social cost of airport noise as measured by rental changes: The case of Logan Airport
N75-10849

RESISTORS
Effect of rapidly changing voltages on thick-film resistors
[BDX-613-1085-REV] N75-10314
Present-day status of accelerated testing of fixed resistors
[ESRO-CR-166] N75-10478

RESOLUTION
S-193 scatterometer transfer function analysis for data processing
[NASA-CR-140314] N75-10569

RESONANCE
Observation equations for resonance parameters of the 13th Order from the orbit analysis of GEOS B, BE-C, and D1D satellites
[SER-C/DISS-198] N75-10132

RESONANT FREQUENCIES
Centaur feedline dynamics study using power spectral methods --- fundamental mode resonant frequencies of RL-10 oxygen and hydrogen feed lines
[NASA-TM-X-3111] N75-10171

RESOURCES MANAGEMENT
Thailand national programme of the Earth Resources Technology Satellite
[E74-10806] N75-10533
The Thailand programme of the Earth Resources Technology Satellite
[E74-10807] N75-10534
Third Earth Resources Technology Satellite Symposium. Volume 2: Summary of results
[NASA-SP-356] N75-10549
Utility of ERTS for monitoring the breeding habit of migratory waterfowl --- United States and Canada
N75-10557
Agriculture, forestry, range resources
N75-10558
Public works for water and power development and Atomic Energy Commission Appropriation Bill, 1975. Part 6: Tennessee Valley Authority
[GPO-32-403] N75-10859

RESPIRATORY SYSTEM
Oral and respiratory immunization
[MBL-1974-4] N75-10698

RETROREFLECTION
Optical transfer function of NTS-1 retroreflector array
[NASA-CR-140667] N75-10773

REYNOLDS NUMBER
The unit Reynolds number effect on boundary layer transition
N75-10340

RHENIUM
Fluctuation effects in the superconducting transition of rhenium
N75-10823

RHENIUM ALLOYS
Interdiffusion behavior of tungsten or rhenium and group 5 and 6 elements and alloys of the periodic table. Part 2A: Appendices A-G
[NASA-CR-134526] N75-10209

RHEOELECTRICAL SIMULATION
Aerospace Research
[ESRO-TT-40] N75-10367
Analog simulation of the small perturbation equation applied to transonic flows --- and wall and cascade flows
N75-10370

RIBBONS
Continuous silicon solar cells
[PB-233949/7] N75-10602

RIGID ROTORS
Hingeless rotorcraft flight dynamics --- research projects to analyze aerodynamic characteristics of rotary wings
[AGARD-AG-197] N75-10003
Techniques for improving the stability of soft in-plane hingeless rotors
[NASA-TM-X-62390] N75-10058

RIVERS
Rivers of the past: Creators of oil
[NASA-TT-F-15974] N75-10517
A study of lagoonal and estuarine processes in the area of Merritt Island encompassing the space center
[NASA-CR-140601] N75-10670

RL-10 ENGINES
Centaur feedline dynamics study using power spectral methods --- fundamental mode resonant frequencies of RL-10 oxygen and hydrogen feed lines
[NASA-TM-X-3111] N75-10171

ROCKET ENGINE DESIGN
Integrated thruster assembly program
[NASA-CR-134509] N75-10163

ROCKET ENGINES
SSME/side loads analysis for flight configuration, revision A --- structural analysis of space shuttle main engine under side load excitation
[NASA-TM-X-64841] N75-10164
Laser rocket engines
[AD-784016] N75-10177

ROCKET EXHAUST
Numerical solution of the Navier-Stokes equations for rocket plumes at 120 km altitude
[AD-784332] N75-10178

ROCKET NOZZLES
Development of high temperature materials for solid propellant rocket nozzle applications --- tantalum carbides-tungsten fiber composites
[NASA-CR-140666] N75-10165

ROCKET-BORNE INSTRUMENTS
Rocket operations plan. Australian eclipse June 1974
[SLA-74-117] N75-10895

ROCKS
An optical instrument for in-situ stress measurement in rocks
[AD-783301] N75-10429
Holographic study of rock specimens under uniaxial and triaxial loads
[AD-784433] N75-10431
Geochemistry of liquids, gases, and rocks from the Smackover formation
[PB-233427/4] N75-10525

ROLLERS
Use of electroslag technique in manufacture of cold-rollers
N75-10218

ROOM TEMPERATURE
Room temperature tensile properties of titanium and seven titanium alloys prepared by skull casting
[BM-RI-7949] N75-10208

ROOMS
Investigation of the thermal load of rooms as a result of solar radiation through windows by laboratory experiments using simulated global radiation
[DLR-FB-73-73] N75-10111

ROTARY WINGS
Hingeless rotorcraft flight dynamics --- research projects to analyze aerodynamic characteristics of rotary wings
[AGARD-AG-197] N75-10003
Lifting surface theory applied to fixed wings and propellers
N75-10016
Evaluation of the accuracy of two helicopter rotor theories
[FFA-124] N75-10020
Some calculations for air resonance of a helicopter with non-articulated rotor blades
[ARC-R/M-3743] N75-10029
Endurance testing of an LM-726-4 elastomeric pitch change bearing
[AD-784140] N75-10074
Investigation of the effects of blade structural design parameters on helicopter stall boundaries
[AD-784594] N75-10075
Low temperature testing of an AH-1G helicopter equipped with elastomeric flapping and feathering bearings in the main rotor
[AD-784189] N75-10081

ROTOR AERODYNAMICS
Hingeless rotorcraft flight dynamics --- research projects to analyze aerodynamic characteristics of rotary wings
[AGARD-AG-197] N75-10003
Elastic pitch beam tail rotor operational suitability investigation
[AD-784595] N75-10069
Investigation of the effects of blade structural design parameters on helicopter stall boundaries
[AD-784594] N75-10075
Low temperature testing of an AH-1G helicopter equipped with elastomeric flapping and feathering bearings in the main rotor
[AD-784189] N75-10081

ROTOR BLADES
Some calculations for air resonance of a helicopter with non-articulated rotor blades
[ARC-R/M-3743] N75-10029
Techniques for improving the stability of soft in-plane hingeless rotors
[NASA-TM-X-62390] N75-10058

ROTOR BLADES [TURBOMACHINERY]
Satellite X4: The 100-element self-scanned photodiode array experiment
[RAE-TR-73195] N75-10145
High speed cascade noise
[TT-7406] N75-10756

ROTORS
Isolated rotor noise due to inlet distortion or turbulence
[NASA-CR-2479] N75-10094

ROUTES
Routing of-aircraft and economics of flight operations
[DLR-FB-74-25] N75-10040

S

S WAVES
Finite-amplitude waves in a stratified jet stream and clear air turbulence
[NASA-TT-F-16002] N75-10628

SACCADIC EYE MOVEMENTS
The generation of saccadic eye movements in vestibular nystagmus --- computerized simulation of nystagmic response to acceleration
[AD-784128] N75-10700

SANDS
Acoustical studies of sound-producing sands --- acoustic properties of sand grains under compression loads
[NASA-TT-F-15715] N75-10752

SATELLITE ANTENNAS
Dual S and Ku-band tracking feed for a TDRS reflector antenna
[NASA-CR-139122] N75-10312

SATELLITE ATTITUDE CONTROL
Analysis and design of a fixed-wheel attitude stabilization system for a stationary satellite --- performance comparisons between systems with and without yaw sensors
[UTIAS-188] N75-10149
On power conditioning for satellite stabilisation thrusters
[RAE-LIB-TRANS-1771] N75-10158
Dynamic simulation facility for satellite attitude control systems --- Symphonie satellite
[BMFT-FB-W-74-02] N75-10159
Design and development of a momentum wheel with a mainly passive magnetic bearing. Volume 1: Design report, phase 1
[ESRO-CR[P]-505-VOL-1] N75-10161
Study of the attitude and orbital control propulsion subsystem for the IME-D project --- interplanetary monitoring explorer daughter propellant evaluation
[T[F]S/033] N75-10175

SATELLITE COMMUNICATIONS SHIPS
EMC test plan for shipboard in-harbor and at-sea measurements for L-band terminal
[NASA-CR-139130] N75-10286

SATELLITE GROUND SUPPORT
Earth stations for satellite communications
[REPT-6866] N75-10280
TDRSS data handling and management system study. Ground station systems for data handling and relay satellite control
[NASA-CR-139128] N75-10289

SATELLITE INSTRUMENTS
Proposal for an experiment for the ESRO geostationary magnetospheric satellite
N75-10144

SATELLITE NAVIGATION SYSTEMS
Propagation effects at radio frequencies on satellite navigation systems --- atmospheric effects on radio transmission
[AD-784378] N75-10747

SATELLITE OBSERVATION
Soviet satellite geodesy: Basis and status of Soviet laser geodesy and long-base line interferometry
[AD-781138/3] N75-10524
Comparison of the Southern and Northern Hemisphere general circulation characteristics as determined by satellite ozone data
[UCRL-75556] N75-10638
Status and prospects of development of space geodesy
[JPRS-63231] N75-10869
Coordinated rocket and satellite observations of the solar corona
[NASA-CR-140581] N75-10892

SATELLITE ORBITS
Observation equations for resonance parameters of the 13th Order from the orbit analysis of GEOS B, BE-C, and DID satellites
[SER-C/DISS-198] N75-10132
ERTS 1 flight evaluation report, January 23, 1973 to April 23, 1973 --- analysis of ERTS-1 systems during orbits 2600-3810
[NASA-CR-140809] N75-10548

SATELLITE PERTURBATION
Computations of M sub 2 and K sub 1 ocean tidal perturbations in satellite elements
[NASA-CR-139124] N75-10851

SATELLITE TRANSMISSION
Major RFI conditions effecting TDRSS
[NASA-CR-139135] N75-10281
Preliminary assessment of RFI impacts on TDRSS in the 2- to 2.3 GHz band
[NASA-CR-139125] N75-10287

SATELLITE-BORNE INSTRUMENTS
Experiment S-59 conversion --- Spacelab-borne UV stellar spectrophotometer
[REPT-311.271] N75-10134
An investigation of the experience and implications of using non Hi-Rel components in European scientific experiments. Volume 1: Summary
[GT-7310-VOL-1] N75-10476
An investigation of the experience and implications of using non Hi-Rel components in European scientific experiments. Volume 2: Main report
[GT-7310-VOL-2] N75-10477

SATURN PROJECT
Trajectory selection for the Mariner Jupiter/Saturn 1977 project
[NASA-CR-140704] N75-10142

SATURN WORKSHOPS
MSFC Skylab mission report: Saturn workshop
[NASA-TM-X-64814] N75-10138

SATURN 1 LAUNCH VEHICLES
Saturn 1B launch vehicle flight evaluation report SA-208 [Skylab-4]
[NASA-TM-X-72019] N75-10140

SCALE MODELS
Scale model testing of the jet noise characteristics of the JT8D refan engine nozzle system
[NASA-CR-134618] N75-10091
A microwave model of the instrument landing system
[PB-232747/6] N75-10113
Effect of ELEVON gap configurations on the longitudinal stability and control effectiveness of the 43-0 space shuttle orbiter [OA118]
[NASA-CR-134407] N75-10152
Cabtrack: Communications and control instrumentation for a one-fifth scale test track
[RAE-TR-73169] N75-10867

SCATTERING
Scattering of background molecules in free jet expansions studied by free molecular flat plate drag measurements
[DLR-FB-74-16] N75-10379
Quasi-optical methods for waveguides and resonators
N75-10768
Scattering of optical beams from slowly varying leaky wave structures
N75-10769

SCATTERING CROSS SECTIONS
N2 scattering measurements at 10.6 microns
[AD-784723] N75-10200

SCATTEROMETERS
S-193 scatterometer transfer function analysis for data processing
[NASA-CR-140314] N75-10569

SCHEDULES
Service C weather schedules
[FAA-7330.7I] N75-10630

SEA STATES
Bistatic radar sea state monitoring
[NASA-CR-137469] N75-10673

SECONDARY FLOW
Influence of the side walls on the turbulent centre-plane boundary layer in a square duct
[IC-AERO-74-06] N75-10382

SEDIMENT TRANSPORT
Dynamics of suspended sediment plumes in Lake Ontario
[E74-10815] N75-10541

SELECTIVE DISSEMINATION OF INFORMATION
Implementation of a mini-computer based information system. Part 1: System overview
[DSIS-TN-16-PT-1] N75-10725

SELF FOCUSING
The influence of self-focusing on the stimulated line of the Rayleigh wing
N75-10771

SELF ORGANIZING SYSTEMS
Research-study of a self-organizing computer
[NASA-CR-140599] N75-10715

SEMICIRCULAR CANALS
Statokinetic reactions of man under conditions of short term weightlessness
[AD-784142] N75-10705

SEMICONDUCTING FILMS
Molecular beam epitaxy of 2-4 compound waveguides
[AD-784650] N75-10837

SEMICONDUCTOR DEVICES
The application of coding to improve the yield and reliability of semiconductor memories --- using large scale integration
N75-10821
Devices based on thermoelectrical phenomena
[AD-783821] N75-10836

SEMICONDUCTOR JUNCTIONS
Radiation damage in metal-semiconductor tunnel junctions
N75-10826

SEMICONDUCTORS [MATERIALS]
Thermal oxidation of gallium arsenide phosphide --- applied to semiconductor technology
N75-10179
The 3-5 surface studies
[AD-784206] N75-10840

SENEGAL
International operations plan for the GARP Atlantic Tropical Experiment, parts 1, 4, 6 and 7
[GATE-9-PT-1] N75-10633
Operations support plan
N75-10636

SENSORY STIMULATION
The dependence of reaction times on the location of the stimulus
[NASA-TT-F-16001] N75-10689

SEPARATED FLOW
On the flow around the leading edge of an aerofoil
N75-10012
Methods of visualizing the leading edge separation bubble and analysis of the results
N75-10013

SET THEORY
Set theoretic approach to data type extension
[LA-UR-73-1287] N75-10726
Topological properties of charge algebras
[RR-143/MBR/KPSBR-5] N75-10734

SHAFTS [MACHINE ELEMENTS]
HLH/ATC engine shaft support bearing development program
[AD-784593] N75-10097
Prospects of manufacturing crankshafts for ship's diesels by the electroslag casting method
N75-10217

SHALE OIL
An economic analysis of oil shale operations featuring gas combustion retorting
[BM-TPR-81] N75-10579
Economic impact of the oil shale industry in western Colorado
[GPO-28-608] N75-10588

SHALLOW SHELL EQUATIONS
Static and dynamic buckling of shallow arches
N75-10482

SHAPES
A simple method of calculating power-law velocity profile exponents from experimental data --- for boundary layer shape factor
[NASA-TM-X-72000] N75-10356

SHARP LEADING EDGES
Pressure distribution on two wings with curved leading edges at supersonic speeds
[ARC-R/M-3741] N75-10028

SHEAR STRESS
Contribution of a wall shear stress to the Magnus effect on nose shapes
[AD-784145] N75-10400

SHIP HULLS
The effects of welding and various postweld treatments on the low-cycle fatigue behavior of 5086-H116 and 5456-H117 aluminum alloys
[AD-784392] N75-10509

SHIPS
In-harbor and at-sea electromagnetic compatibility survey for maritime satellite L-band shipboard terminal
[NASA-CR-139131] N75-10284
Optimization of waterjet propulsion systems for surface effect ships
[AD-781916] N75-10464
Cruise data report. CHAIN 115 leg 2, Southlant expedition --- to survey geophysical parameters
[AD-784421] N75-10641

SHOCK ABSORBERS
Translatory shock absorbers for attitude sensors
[NASA-CASE-MFS-22905-1] N75-10407

SHOCK TUNNELS
CO2 MHD laser: Analysis, design and shock tunnel experiments
[AD-782226] N75-10443

SHOCK WAVES
Critical energy for shock initiation of tetryl and A-5
[UCID-16469] N75-10260
Shock-tube studies of vibrational equilibration in carbon dioxide by simultaneous laser absorption and infrared-emission measurements
N75-10346

SHORT TAKEOFF AIRCRAFT
Simulation studies of STOL airplane operations in metropolitan downtown and airport air traffic control environments
[NASA-TN-D-7740] N75-10038
Analysis of a flare-director concept for an externally blown flap STOL aircraft
[NASA-TN-D-7760] N75-10061

SHROUDS
Shrouded impeller test program
[AD-784133] N75-10100

SIDE INLETS
The external drag of fuselage side intakes: Rectangular intakes with compression surfaces vertical
[ARC-CP-1269] N75-10025

SIGNAL ANALYSIS
Methods of investigation for manual control processes
[FB-15] N75-10738

SIGNAL DETECTION
Methodology for computation of interface parameters of a hot-wire explosive device from the electrothermal response analog
[SLA-73-1034] N75-10261

SIGNAL DETECTORS
Memory systems for signal generating photoelectric image detectors
[NASA-CR-140669] N75-10408

SIGNAL DISTORTION
The J-code: A minimum peak distortion code
[AD-783949] N75-10296

SIGNAL PROCESSING
Digital modeling in statistical radio engineering
[AD-783732] N75-10294
Study of the use of Charge-Coupled Devices [CCDs] in analog signal processing systems
[AD-783703] N75-10300

SIGNAL RECEPTION
Interference with aircraft radio navigation and communications by precipitation static from ice and snow clouds: Electrostatic wind tunnel experiments
[AD-784623] N75-10046
Multipath compensation of a DQPSK communication link
N75-10277
Susceptibility of UHF RF transistors to high power UHF signals
[AD-780536/9] N75-10297

SILICON
Continuous silicon solar cells
[PB-233949/7] N75-10602

SILICON ALLOYS
Thermodynamics of the Al-Si system
[PB-234070/1] N75-10846

SILICON CARBIDES
Strengthening of oxidation resistant materials for gas turbine applications --- treatment of silicon ceramics for increased flexural strength and impact resistance
[NASA-CR-134661] N75-10092

SILICON NITRIDES
Strengthening of oxidation resistant materials for gas turbine applications --- treatment of silicon ceramics for increased flexural strength and impact resistance
[NASA-CR-134661] N75-10092
Effect of selected impurities on the high temperature mechanical properties of hot-pressed silicon nitride
[AD-783506] N75-10255

SILVER COMPOUNDS
An experimental determination of long wavelength phonons and anomalous dielectric behavior in proustite and pyrargyrite
[AD-784309] N75-10841

SIMULATION
Dielectric constants and dissipation factors of simulated lunar rocks
[PB-234053/7] N75-10575

SINGLE CRYSTALS
Single crystals of metal solid solutions
[NASA-CR-120511] N75-10225
Particle size distribution effects in precipitation hardening
[UCLA-34-P-172-11] N75-10232

SIZE SEPARATION
A method for identifying large particles in laser anemometry --- mie scattering
[ISL-37/73] N75-10441

SKYLAB PROGRAM
Physical forces influencing Skylab experiments M551, M552, and M553
[NASA-CR-129037] N75-10117
Characterization of metals melting discs Skylab experiment M551
[NASA-CR-129041] N75-10118
Convection effects on Skylab experiments M551, M552, and M553, phase C report --- metal melting, exothermic brazing, and sphere forming under weightless conditions
[NASA-CR-120482] N75-10120
MSFC Skylab corollary experiment systems mission evaluation
[NASA-TM-X-64820] N75-10121
Retention and application of Skylab experiences to future programs --- a postflight review of technical programs.
[NASA-TM-X-64853] N75-10126
MSFC Skylab mission report: Saturn workshop
[NASA-TM-X-64814] N75-10138
Saturn 1B launch vehicle flight evaluation report SA-208 [Skylab-4]
[NASA-TM-X-72019] N75-10140
Engineering studies related to the Skylab program
[NASA-CR-137473] N75-10143
Probability of illness definition for the Skylab flight crew health stabilization program
[NASA-CR-140300] N75-10691
Foil activation analysis and thermoluminescent dosimetry on Skylab 2 --- for monitoring radiation levels
[AD-783779] N75-10704

SKYNET SATELLITES
Skynet 2-b/Delta 105
[NASA-NEWS-RELEASE-74-303] N75-10124

SLENDER WINGS
The design of a series of warped slender wings for subsonic speeds
[ARC-CP-1263] N75-10022
Low-speed wing-tunnel measurements of the lift, drag and pitching moment of a series of cropped delta wings
[ARC-R/M-3744] N75-10030

SLOTTED WIND TUNNELS
Ground effect for V/STOL aircraft configurations and its simulation in the wind tunnel. Part 3: The tangentially blown ground as an alternative to a moving ground: Application to the NASA-Ames 40 by 80-foot wind tunnel
[NASA-CR-114497] N75-10005

SMALL PERTURBATION FLOW
Aerospace Research
[ESRO-TT-40] N75-10367
Analog simulation of the small perturbation equation applied to transonic flows --- and wall and cascade flows
N75-10370

SNOW COVER
Evaluate ERTS imagery for mapping and detection of changes of snowcover on land and on glaciers --- Alaska and Washington
[E74-10812] N75-10539

SOCIAL FACTORS
The social cost of airport noise as measured by rental changes: The case of Logan Airport
N75-10849

SODIUM CHLORIDES
Secondary high pressure standard for the far-infrared spectral region --- considering sodium chloride lattice structure
[COO-3151-37] N75-10832

SODIUM COMPOUNDS
Preliminary design of a Primary Loop Pump Assembly [PLPA], using electromagnetic pumps
[NASA-CR-140713] N75-10458

SOIL MAPPING
ERTS-1 imagery interpretation techniques in the Tennessee Valley --- land use and soil mapping
[E74-10811] N75-10538

SOIL SCIENCE
Transformation of organic substances in soil
[NASA-TT-F-15985] N75-10521
Developing processing techniques for Skylab data --- vegetation and soil identification
[E74-10799] N75-10527

SOILS
The PUCE programme for terrain evaluation for engineering purposes. 2: Procedures for terrain classification
[PB-233847/3] N75-10625

SOLAR CELLS
Continuous silicon solar cells
[PB-233949/7] N75-10602

SOLAR CORONA
Coordinated rocket and satellite observations of the solar corona
[NASA-CR-140581] N75-10892

SOLAR COSMIC RAYS
Nuclear composition of solar cosmic rays
[MPI-PAE/EXTRATERR-101] N75-10896

SOLAR ECLIPSES
Rocket operations plan. Australian eclipse June 1974
[SLA-74-117] N75-10895

SOLAR ENERGY
Effective utilization of solar energy to produce clean fuel
[PB-233956/2] N75-10605

SOLAR ENERGY ABSORBERS
Solar energy absorber
[NASA-CASE-MFS-22743-1] N75-10585
Solar energy trap
[NASA-CASE-MFS-22744-1] N75-10586

SOLAR ENERGY CONVERSION
Development of solar engineering in the USSR
[AD-784708] N75-10597
SOLAR FLARES
Nuclear composition of solar cosmic rays
[MPI-PAE/EXTRATERR-101] N75-10896
SOLAR GENERATORS
Thermal vacuum qualification test of No. 1 Hawker Siddeley Dynamics low speed mechanism --- for solar paddles
[ESRO-ESTL-3] N75-10461
Activities of the European Space Tribology Laboratory --- thermal vacuum test facilities
[ESRO-ESTL-5] N75-10462
SOLAR HEATING
Optimal material systems for frame buildings subjected to solar heating --- computerized selection of laminate materials
N75-10480
Research, development, and the energy crisis
[GPO-27-032] N75-10580
SOLAR PROTONS
The variation of solar proton energy spectra size distribution with heliolongitude
[NASA-TM-X-70770] N75-10899
SOLAR RADIATION
On calculating radioactive fluxes and temperature changes in atmospheres off arbitrary structure
[AD-784442] N75-10659
SOLAR SENSORS
Mariner Mars 1971 attitude control subsystem
[NASA-CR-140706] N75-10168
SOLAR SIMULATION
Investigation of the thermal load of rooms as a result of solar radiation through windows by laboratory experiments using simulated global radiation
[DLR-FB-73-73] N75-10111
SOLAR SYSTEM
Dynamics of the solar wind and its interaction with bodies in the solar system
[NASA-CR-140702] N75-10894
SOLAR WIND
Interplanetary space-A new laboratory for rarefied gas dynamics
[NASA-TM-X-72050] N75-10125
Termination of the solar wind in the hot, partially ionized interstellar medium
[NASA-CR-140699] N75-10893
Dynamics of the solar wind and its interaction with bodies in the solar system
[NASA-CR-140702] N75-10894
SOLDERING
Effect of soldering flux on Ta2N resistors
[SLA-73-1045] N75-10317
SOLID ROCKET PROPELLANTS
Development of high temperature materials for solid propellant rocket nozzle applications --- tantalum carbides-tungsten fiber composites
[NASA-CR-140666] N75-10165
Theoretical performance of organic polymers in hybrid engines with hydrogen peroxide as oxidizer --- rocket propellant performance
[ESRO-TT-94] N75-10262
Asymmetric grain evaluation computer program --- for solid rocket propellant
[AD-784350] N75-10264
Ecological effects and environmental fate of solid rocket exhaust
[NASA-CR-140598] N75-10616
SOLID SOLUTIONS
Single crystals of metal solid solutions
[NASA-CR-120511] N75-10225
Diffusion studies in nonmetallic system, part 1 --- formation of nickel alumina oxides
[AD-784437] N75-10246
SOLID STATE
Dispersion and instability characteristics of solid-state carrier waves in microwave integrated systems --- based on Maxwell, continuity, and Boltzmann transport equations
N75-10827
SOLID STATE DEVICES
Optical waveguide data transmission for avionics --- analysis of materials, structures, circuits, and waveguide/terminal interface
N75-10779
The two dimensional transient solution of the carrier transport equations in solid-state devices
N75-10819
Control of electrostatic damage to solid state devices
[BDX-613-1080] N75-10830
SOLID STATE PHYSICS
Research on varied properties of metals, ceramics, polymers, and alloys
[AD-783964] N75-10185
Research in solid state, plasmas, electrical and biomedical engineering
[AD-784655] N75-10750
SOLID SURFACES
Generation of velocity profiles using screens of nonuniform solidity
N75-10362
SOLIDIFICATION
Directionally solidified Co-Cr-C composites. Microstructure and strength between 20 C and 1050 C obtained by different solidification modes
[RAE-LIB-TRANS-1764] N75-10187
SOLIDS
Analytical modeling of defects in solids --- including edge dislocations and microcracks
N75-10824
SONAR
Underwater applications of acousto-optical imaging
[AD-784419] N75-10759
SOUND FIELDS
Fluid dynamic aspects of jet noise generation
[NASA-CR-140673] N75-10088
Sound field intensities in liquids and solids --- nondestructive tests of sound transmission
[ARL/MET-NOTE-100] N75-10753
SOUND INTENSITY
Sound field intensities in liquids and solids --- nondestructive tests of sound transmission
[ARL/MET-NOTE-100] N75-10753
SOUND PROPAGATION
A computing method for sound propagation through a nonuniform jet stream
[NASA-TM-X-71941] N75-10359
Acoustical studies of sound-producing sands --- acoustic properties of sand grains under compression loads
[NASA-TT-F-15715] N75-10752
Sound turbulence interaction
[TT-7404] N75-10754
SOUND TRANSMISSION
Sound field intensities in liquids and solids --- nondestructive tests of sound transmission
[ARL/MET-NOTE-100] N75-10753
SOUND WAVES
Conversion of an ion-acoustic wave by collisions to a neutral sound wave in a nonhomogeneous plasma
[AD-782099] N75-10758
SOUTHERN HEMISPHERE
Comparison of the Southern and Northern Hemisphere general circulation characteristics as determined by satellite ozone data
[UCRL-75556] N75-10638
SPACE ENVIRONMENT SIMULATION
Performance monitor system functional simulator, environmental data, orbiter 101[HFT]
[NASA-TM-X-72028] N75-10136
Dynamic simulation facility for satellite attitude control systems --- Symphonie satellite
[BMFT-FB-W-74-02] N75-10159
SPACE FLIGHT FEEDING
Food unit, based on reserves of dehydrated products, in life support systems for crews of spaceships during prolonged flights --- space flight feeding and spacecrew body weights
[AD-784289] N75-10710
SPACE LABORATORIES
Spacelab program requirements, level 1
[NASA-TM-X-72031] N75-10137
SPACE LAW
International space law
[NASA-TT-F-15912] N75-10865
SPACE MANUFACTURING
Physical forces influencing Skylab experiments M551, M552, and M553
[NASA-CR-129037] N75-10117
Characterization of metals melting discs Skylab experiment M551
[NASA-CR-129041] N75-10118
Research study on materials processing in space experiment number M512: Nickel - 12 wt percent tin alloy evaluation
[NASA-CR-129038] N75-10119
Convection effects on Skylab experiments M551, M552, and M553, phase C report --- metal melting, exothermic brazing, and sphere forming under weightless conditions
[NASA-CR-120482] N75-10120
Liquid phase sintered compacts in space
[NASA-CR-120507] N75-10122
SPACE MISSIONS
MSFC Skylab mission report: Saturn workshop
[NASA-TM-X-64814] N75-10138
SPACE PROGRAMS
Retention and application of Skylab experiences to future programs --- a postflight review of technical programs.
[NASA-TM-X-64853] N75-10126
SPACE SHUTTLE ORBITERS
Aerodynamic results of support system interference effects tests conducted in NASA/ARC 6 by 6-foot supersonic wind tunnel using an 0.015-scale model of the configuration 140A/B SSV orbiter [OA59], volume 1
[NASA-CR-134410] N75-10108
Aerodynamic results of support system interference effects tests conducted in NASA/ARC 6 by 6-foot supersonic wind tunnel using a 0.015 scale model of the configuration 140A/B SSV orbiter, volume 2
[NASA-CR-134412] N75-10109
Performance monitor system functional simulator, environmental data, orbiter 101[HFT]
[NASA-TM-X-72028] N75-10136
Effects of reaction control system jet flow field interactions on the aerodynamic characteristics of a 0.010-scale space shuttle orbiter model in the Langley Research Center 31 inch CFHT [OA85]
[NASA-CR-134111] N75-10148
Effect of ELEVON gap configurations on the longitudinal stability and control effectiveness of the 43-0 space shuttle orbiter [OA118]
[NASA-CR-134407] N75-10152
Effects of air breathing engine plumes on SSV orbiter subsonic wing pressure distribution, volume 2
[NASA-CR-134417] N75-10153
Results of an investigation of hypersonic viscous interaction effects on an 0.01 scale space shuttle orbiter 51-0 model in the AEDC-VKE hypervelocity wind tunnel
[NASA-CR-134423] N75-10360
SPACE SHUTTLES
HAL/S language specification
[NASA-CR-140279] N75-10101
Station set requirements document. Volume 82: Fire support. Book 2: Preliminary functional fire plan
[NASA-TM-X-72032] N75-10105
Three models for scheduling space shuttle missions and resources
[NASA-CR-140319] N75-10127
Static stability characteristics of the space shuttle external tank [MSFC model 458] during reentry in the MSFC 14-inch TWT [TA1F]
[NASA-CR-134420] N75-10151
Pressure and heat flux results from the space shuttle/external fuel tank interaction test at Mach numbers 16 and 19
[NASA-CR-134418] N75-10154
Frequency standard stability for Doppler measurements on-board the shuttle
[NASA-TM-X-72030] N75-10156
SSME/side loads analysis for flight configuration, revision A --- structural analysis of space shuttle main engine under side load excitation
[NASA-TM-X-64841] N75-10164
Space shuttle orbit maneuvering engine reusable thrust chamber program
[NASA-CR-140321] N75-10167
Results of reaction control system on-orbit jet simulation using an 0.0175-scale configuration 3 space shuttle orbiter model [21-0] in the LaRC 60-foot vacuum sphere
[NASA-CR-134415] N75-10170
Shuttle sortie electro-optical instruments study
[NASA-CR-132457] N75-10406
Environmental control system transducer development study --- for space shuttles
[NASA-CR-140312] N75-10409
SPACECRAFT COMMUNICATION
Earth stations for satellite communications
[REPT-6866] N75-10280
Major RFI conditions effecting TDRSS
[NASA-CR-139135] N75-10281
Preliminary assessment of RFI impacts on TDRSS in the 2- to 2.3 GHz band
[NASA-CR-139125] N75-10287
Access control and processing studies for ground satellite mobile communications/surveillance systems
[AD-784380] N75-10291
Frequency choice for tactical satellite communications
[AD-783912] N75-10298
SPACECRAFT COMPONENTS
Study of an interface structure design, phase 1 --- conical type structure and flat platform in beryllium
[ESS/SS-526] N75-10160
ERTS 1 flight evaluation report, 23 October 1973 - 23 January 1974 --- orbits 6371 to 7651
[NASA-CR-140712] N75-10546
ERTS 1 flight evaluation report, 23 January - 23 April 1974 --- orbits 7652 to 8907
[NASA-CR-140810] N75-10547
ERTS 1 flight evaluation report, January 23, 1973 to April 23, 1973 --- analysis of ERTS-1 systems during orbits 2600-3810
[NASA-CR-140809] N75-10548
ERTS 1 flight evaluation report, 23 April 1974 23 July 1974 --- orbits 8908 to 10182
[NASA-CR-140711] N75-10568
Triad computer
[AD-784372] N75-10718
SPACECRAFT CONTAMINATION
Planetary quarantine: Space research and technology
[NASA-CR-140806] N75-10707
SPACECRAFT DESIGN
HAL/S language specification
[NASA-CR-140279] N75-10101
SPACECRAFT GUIDANCE
Study of the attitude and orbital control propulsion subsystem for the IME-D project --- interplanetary monitoring explorer daughter propellant evaluation
[T[F]S/033] N75-10175
SPACECRAFT ORBITS
Orbit determination for deep space missions by means of Doppler and ranging
[ESRO-TT-80] N75-10146

SPACECRAFT POWER SUPPLIES
Modeling and analysis of power processing systems: Feasibility investigation and formulation of a methodology
[NASA-CR-134686] N75-10150
Testing of NiCd cells over geostationary orbit type cycling period
[ESRO-CR[P]-504] N75-10596
SPACECRAFT PROPULSION
SSME/side loads analysis for flight configuration, revision A --- structural analysis of space shuttle main engine under side load excitation
[NASA-TM-X-64841] N75-10164
SPACECRAFT STABILITY
Analysis and design of a fixed-wheel attitude stabilization system for a stationary satellite --- performance comparisons between systems with and without yaw sensors
[UTIAS-188] N75-10149
SPACECREWS
Probability of illness definition for the Skylab flight crew health stabilization program
[NASA-CR-140300] N75-10691
Food unit, based on reserves of dehydrated products, in life support systems for crews of spaceships during prolonged flights --- space flight feeding and spacecrew body weights
[AD-784289] N75-10710
SPACELAB
ESRO Nimra conversion study --- conversion of IR radiometers to spacelab compatible experiments to measure atmospheric gas distribution
[HSD-TP-7472] N75-10133
Experiment S-59 conversion --- Spacelab-borne UV stellar spectrophotometer
[REPT-311.271] N75-10134
SPECIMEN GEOMETRY
Investigation on the influence of temperature and specimen geometry on the fracture toughness properties of TiAl6V4
[ESRO-TT-75] N75-10234
SPECTRAL ENERGY DISTRIBUTION
Analysis of spectral density curves in wind tunnel flutter measurements
N75-10017
SPECTRAL LINE WIDTH
Experimental measurement of internal characteristics of spectral lines using the Roschdestvenskii hook method
[AD-783614] N75-10184
The optical spectrum of Sco X-1 --- and analysis of emissionline widths
N75-10872
SPECTROHELIOGRAPHS
The variation of solar proton energy spectra size distribution with heliolongitude
[NASA-TM-X-70770] N75-10899
SPECTROMETERS
The 8-18 GHz radar spectrometer
[NASA-CR-140317] N75-10411
Electron energy loss spectrometry
[BMFT-FB-T-74-06] N75-10788
SPECTROPHOTOMETRY
Absolute spectrophotometry in M31 and M32
[NASA-CR-140683] N75-10879
SPECTROSCOPIC ANALYSIS
Laser Raman spectroscopy of solutes dissolved in water from a remote platform
[PB-233432/4] N75-10202
Spectroscopic study of metal vapor kinetics
[AD-783275] N75-10265
Electron energy loss spectrometry
[BMFT-FB-T-74-06] N75-10788
SPECTRUM ANALYSIS
Experimental measurement of internal characteristics of spectral lines using the Roschdestvenskii hook method
[AD-783614] N75-10184
Developing processing techniques for Skylab data --- vegetation and soil identification
[E74-10799] N75-10527
The optical spectrum of Sco X-1 --- and analysis of emissionline widths
N75-10872
SPHERES
High frequency electromagnetic wave backscattering from radially inhomogeneous dielectric spheres
N75-10742
Correlation of thermodynamic properties of fluids through generalized hard sphere-augmented equation of state
N75-10843
SPHERICAL SHELLS
Analysis of a shallow spherical shell containing an asymmetrically located ring stiffened circular hole subjected to an arbitrarily located concentrated load
[AD-783351] N75-10511
SPIN DYNAMICS
Contribution of a wall shear stress to the Magnus effect on nose shapes
[AD-784145] N75-10400
SPIN-LATTICE RELAXATION
The spin-temperature theory of dynamic nuclear polarization and nuclear spin-lattice relaxation
[NASA-TR-R-427] N75-10765
STABILITY
Linear parametric instabilities at high pump powers
[AD-783780] N75-10814
STABILITY DERIVATIVES
Extraction from flight data of lateral aerodynamic coefficients for F-8 aircraft with supercritical wing
[NASA-TN-D-7749] N75-10006
Determination of aerodynamic derivatives using the discrete Fourier transformation of transient oscillations
[DLR-FB-74-17] N75-10018
Aerodynamic symmetry of aircraft and guided missiles --- development of configurations to eliminate certain force and moment derivatives
[AD-784254] N75-10070
STAINLESS STEELS
The effect of ausworking on the strength of type 420 stainless steel with the addition of carbide-forming elements
N75-10206
STANDARD DEVIATION
Optimal confidence intervals for the standard deviation of a normal distribution
[ARL/SM-NOTE-406] N75-10737
STANDARDS
Secondary high pressure standard for the far-infrared spectral region --- considering sodium chloride lattice structure
[COO-3151-37] N75-10832
New motor vehicle emission standards and fuel economy
[GPO-29-272] N75-10863
STANDING WAVES
Calculation of inductive plasma accelerators with sinusoidal electromagnetic standing waves for continuous energy supply
[ESRO-TT-76] N75-10809
STAR TRACKERS
Mariner Mars 1971 attitude control subsystem
[NASA-CR-140706] N75-10168
High angular resolution and position determinations by infrared interferometry
[NASA-CR-140670] N75-10877
STATIC DISCHARGERS
Technology development report: Results of static electricity discharge system tests [active and passive] heavy lift helicopter
[AD-784130] N75-10082
STATIC PRESSURE
An improved static pressure probe
[NASA-CASE-LAR-11552-1] N75-10412
STATIC STABILITY
Dynamic and static balancing gyroscopic equipment
N75-10401
STATIC TESTS
High acceleration cockpits for advanced fighter aircraft. Volume 3: Test plan --- static tests and mission profiles
[AD-783602] N75-10066
STATISTICAL ANALYSIS
Annual review of aircraft accident data: US General Aviation calendar year 1971
[NTSB-ARG-74-2] N75-10037
Direct statistical analysis of missile guidance systems via cadet [covariance analysis describing function technique]
[AD-783098] N75-10162
Theoretical principles of statistical radiotechnology, book 1 --- using probability theory
N75-10276
Some statistical analyses of Hawaiian rainfall
[PB-233674/1] N75-10656
Optimal confidence intervals for the standard deviation of a normal distribution
[ARL/SM-NOTE-406] N75-10737
STATISTICAL DISTRIBUTIONS
An empirical analysis of the distribution of overshoots in a stationary Gaussian stochastic process
[NASA-CR-129008] N75-10736
STATISTICAL MECHANICS
Network models of crystals
[AD-784516] N75-10835
Nonequilibrium statistical thermodynamics
[AD-784411] N75-10847
STEADY FLOW
Second order boundary layer theory for steady, laminar, compressible flow on curved surfaces
[ESRO-TT-85] N75-10384
STEELS
The effect of the titanium content on the active corrosion of ferritic r-steels and austenitic Cr-Ni-steels in sulfuric acid
[NASA-TT-F-15994] N75-10211
Electroslag remelting during production of sheet steel
N75-10215
Investigating the quality of welded electroslag joints of rotors 1500 MM in diameter of 25[KHN3MF] steel of electroslag and electrofurnace smelting
N75-10222
Relationship between microstructure and fracture toughness in D6ac steel
[ARL/MET-NOTE-103] N75-10227
Superplasticity of steel KH18N10T
[AD-784175] N75-10245
A semi-delphi exercise on fluorspar and manganese in steelmaking
[NMAB-317] N75-10273
Plane strain fracture toughness testing on center-cracked plates under uniform tension --- mild steels and polymethyl methacrylate
[CRIF-MT-91] N75-10500
The collection, generation, and analysis of MIL-HDBK-5 allowable design data --- fatigue data for aluminum alloys, titanium alloys, and steels
[AD-783616] N75-10506
STELLAR ATMOSPHERES
Theoretical investigation of stellar atmospheres with specific application to the atmosphere of a carbon star R coronae borealis
N75-10871
A comparison of lyman alpha and He lambda 10830 line structures and variations in early-type star atmospheres
[NASA-CR-140572] N75-10876
STELLAR ENVELOPES
Outer layers of white dwarf stars --- the relation of convection to luminousity
N75-10870
STELLAR EVOLUTION
A numerical study of protostellar formation --- the evolution of gravitationally bound gas clouds from the interstellar medium
N75-10874
STELLAR LUMINOSITY
Outer layers of white dwarf stars --- the relation of convection to luminousity
N75-10870
STELLAR SPECTROPHOTOMETRY
Experiment S-59 conversion --- Spacelab-borne UV stellar spectrophotometer
[REPT-311.271] N75-10134
GAO 2/Wisconsin Experiment Package [WEP] photometer users guide
[NASA-TM-X-72533] N75-10410
STEREOPHOTOGRAPHY
Studies in stereophotogrammetry
[AD-784425] N75-10576
STERILIZATION EFFECTS
Self-sterilization of bodies during outer planet entry
[NASA-CR-140808] N75-10678
Probability of illness definition for the Skylab flight crew health stabilization program
[NASA-CR-140300] N75-10691
STOCHASTIC PROCESSES
Reliable results from stochastic simulation models
[USDA-NE-277] N75-10735
An empirical analysis of the distribution of overshoots in a stationary Gaussian stochastic process
[NASA-CR-129008] N75-10736
STORAGE RINGS [PARTICLE ACCELERATORS]
Transport and divertor studies in the FM-1 spherator
[MATT-1078] N75-10803
STORMS [METEOROLOGY]
Map diagram of the number of days with dust storms in the hot zone of the USSR and adjacent territories
[AD-784100] N75-10668
The frequency of the most intensive dust storms in the Ukraine
[AD-784101] N75-10669
STRAPDOWN INERTIAL GUIDANCE
An adaptive technique for a redundant-sensor navigation system
[NASA-CR-140313] N75-10042
STRATOSPHERE
Quantitative determination of stratospheric aerosol characteristics
[E74-10808] N75-10535
STRESS [PHYSIOLOGY]
Effect of stress on fat metabolism in connection with fat contents of emergency rations
[R-4255] N75-10680
High altitude pulmonary edema
[AD-782240] N75-10702
Statokinetic reactions of man under conditions of short term weightlessness
[AD-784142] N75-10705
STRESS [PSYCHOLOGY]
Effect of stress on fat metabolism in connection with fat contents of emergency rations
[R-4255] N75-10680
STRESS ANALYSIS
Determination of the forces in the retractor of a three-dimensional landing gear mechanism
[AD-784257] N75-10078
Nonlinear finite-element formulation for transient analysis of three-dimensional thin structures
[ANL-8104] N75-10486
SPAR reference manual --- for stress analysis
[NASA-CR-120504] N75-10495
SPAR demonstration problems --- for stress analysis
[NASA-CR-120505] N75-10496
Activities of the Solid State Technology Institute
N75-10502
STRESS CORROSION
Surface structure and applied stress in corrosion rate
[AD-783402] N75-10247

STRESS CORROSION CRACKING
Effect of composition on stress corrosion cracking of austenitic stainless steels in several concentrations of boiling MgCl2 solutions
[NASA-TT-F-15995] N75-10207

STRESS CYCLES
Significance of cyclic history dependent deformation phenomena of metals on fatigue life estimation
[AD-784297] N75-10507

STRESS MEASUREMENT
An optical instrument for in-situ stress measurement in rocks
[AD-783301] N75-10429

STRESS-STRAIN DIAGRAMS
A computer program for plotting stress-strain data from compression, tension, and torsion tests of materials
[NASA-TM-X-3091] N75-10485

STRESSES
Extremal boundary value problems in the theory of plasticity
[AD-784172] N75-10513

STRIP MINING
Geographic applications of ERTS-1 imagery to landscape change --- Mississippi River and Great Smoky Mountains of Tennessee and North Carolina
[E74-10810] N75-10537
Automated strip mine and reclamation mapping from ERTS --- Ohio coal
N75-10556

STRIP TRANSMISSION LINES
Stripline flush mount antenna array
[AD-783334] N75-10335

STRUCTURAL ANALYSIS
SSME/side loads analysis for flight configuration, revision A --- structural analysis of space shuttle main engine under side load excitation
[NASA-TM-X-64841] N75-10164
Vibration and stability of structures with high electric currents
N75-10309
WINDOWAC [Wing Design Optimization With Aeroelastic Constraints]: Program manual
[NASA-TM-X-3071] N75-10484
Nonlinear finite-element formulation for transient analysis of three-dimensional thin structures
[ANL-8104] N75-10486
Activities of the Solid State Technology Institute
N75-10502
Analytical modeling of defects in solids --- including edge dislocations and microcracks
N75-10824

STRUCTURAL DESIGN
High acceleration cockpits for advanced fighter aircraft. Volume 1: Program summary --- human factors engineering for optimal design
[AD-783600] N75-10064
High acceleration cockpits for advanced fighter aircraft. Volume 2: Crew station design/integration --- control and display devices
[AD-783601] N75-10065
High acceleration cockpits for advanced fighter aircraft. Volume 3: Test plan --- static tests and mission profiles
[AD-783602] N75-10066
Study of an interface structure design, phase 1 --- conical type structure and flat platform in beryllium
[ESS/SS-526] N75-10160
Minimum-weight designs for hat-stiffened composite panels under uniaxial compression
[NASA-TN-D-7779] N75-10497

STRUCTURAL DESIGN CRITERIA
The CCV concept and specifications
[NASA-TT-F-15997] N75-10060
High acceleration cockpits for advanced fighter aircraft. Volume 4: Test results
[AD-783603] N75-10067
Optimal material systems for frame buildings subjected to solar heating --- computerized selection of laminate materials
N75-10480
WINDOWAC [Wing Design Optimization With Aeroelastic Constraints]: Program manual
[NASA-TM-X-3071] N75-10484

STRUCTURAL ENGINEERING
Methods of finite elements in analyses of continuous and combined constructions
[AD-783969] N75-10508

STRUCTURAL PROPERTIES [GEOLOGY]
Assessment of ERTS-1 imagery as a tool for regional geological analysis in New York State --- Lake Ontario
[E74-10809] N75-10536
Mineral resources, geological structures, and landform surveys
N75-10561

STRUCTURAL STABILITY
Static and dynamic buckling of shallow arches
N75-10482

STRUCTURAL VIBRATION
Free and forced vibration of rectangular plate with damping and arbitrary boundary conditions
N75-10481

STRUCTURAL WEIGHT
Minimum-weight designs for hat-stiffened composite panels under uniaxial compression
[NASA-TN-D-7779] N75-10497

SUBMILLIMETER WAVES
Gallium arsenide submillimeter photoconductive detection
N75-10820

SUBROUTINES
Further work on the integration of closed loops specified only as discrete data points --- using FORTRAN
[RAE-TR-73177] N75-10723

SUBSONIC FLOW
Application of the polar coordinate method to oscillating wing configurations
[SAAB-TN-69] N75-10010
A two-dimensional aerofoil oscillating at low frequencies in high subsonic flow
[ARC-CP-1285] N75-10027
Experimental determination of the pressure recovery coefficients in conical diffusors at large subsonic velocities under various inlet conditions
[NASA-TT-F-15991] N75-10354

SULFURIC ACID
The effect of the titanium content on the active corrosion of ferritic r-steels and austenitic Cr-Ni-steels in sulfuric acid
[NASA-TT-F-15994] N75-10211

SUPERCONDUCTORS
Fluctuation effects in the superconducting transition of rhenium
N75-10823

SUPERCRITICAL FLOW
Aerospace Research
[ESRO-TT-40] N75-10367
Time-dependent methods for computing wall effects in two-dimensional supercritical flow --- over an airfoil
N75-10369

SUPERCRITICAL WINGS
Extraction from flight data of lateral aerodynamic coefficients for F-8 aircraft with supercritical wing
[NASA-TN-D-7749] N75-10006

SUPERFLUIDITY
Vortex ring generated level differences in superfluid helium
N75-10818

SUPERHIGH FREQUENCIES
Simultaneous dual-band radar development
[NASA-CR-140303] N75-10283
Frequency choice for tactical satellite communications
[AD-783912] N75-10298
Dual S and Ku-band tracking feed for a TDRS reflector antenna
[NASA-CR-139122] N75-10312
FM laboratory measurements on the 12GHz klystron YK 1210 [V42SK]
[ESRO-CR[P]-523] N75-10324

SUPERSATURATION
Accuracy of homogeneous nucleation rates determined in supersonic nozzles
[AD-784506] N75-10388

SUPERSONIC AIRCRAFT
Transport processes and trace constituents in the stratosphere --- effects of supersonic aircraft operation on ozone distribution
[COO-2249-3] N75-10523

SUPERSONIC COMBUSTION
Analytical chemical kinetic investigation of the effects of oxygen, hydrogen, and hydroxyl radicals on hydrogen-air combustion
[NASA-TN-D-7769] N75-10195

SUPERSONIC COMBUSTION RAMJET ENGINES
Dual mode ramjet theoretical and experimental performance for Mach 3.5 to 7 domain of flight velocities
N75-10368

SUPERSONIC FLOW
Pressure distribution on two wings with curved leading edges at supersonic speeds
[ARC-R/M-3741] N75-10028
A shock capturing method for calculating supersonic flow fields
[ARC-CP-1290] N75-10381
Calculation of the plane supersonic flow through cascades using the method of analytical characteristics
[ESRO-TT-78] N75-10383
Accuracy of homogeneous nucleation rates determined in supersonic nozzles
[AD-784506] N75-10388
Flow of a two phase medium with solid particles around a thin profile
[AD-783571] N75-10393

SUPERSONIC SPEEDS
Measurements of dynamic stability derivatives of an ogive delta wing model at transonic and supersonic speeds
[FFA-TN-AU-925] N75-10019
A study of the damping characteristics on models of supersonic air lines at supersonic speeds
[AD-784259] N75-10077
An improved static pressure probe
[NASA-CASE-LAR-11552-1] N75-10412

SUPERSONIC TRANSPORTS
A study of the damping characteristics on models of supersonic air lines at supersonic speeds
[AD-784259] N75-10077

SUPERSONIC WIND TUNNELS
Aerodynamic results of support system interference effects tests conducted in NASA/ARC 6 by 6-foot supersonic wind tunnel using an 0.015-scale model of the configuration 140A/B SSV orbiter [OA59], volume 1
[NASA-CR-134410] N75-10108
Aerodynamic results of support system interference effects tests conducted in NASA/ARC 6 by 6-foot supersonic wind tunnel using a 0.015 scale model of the configuration 140A/B SSV orbiter, volume 2
[NASA-CR-134412] N75-10109
Vapor screen techniques development at the Ballistic Research Laboratories
[AD-784077] N75-10116

SUPPORT SYSTEMS
Operations support plan
N75-10636

SUPPORTS
HLH/ATC engine shaft support bearing development program
[AD-784593] N75-10097

SURFACE DEFECTS
Mechanism of formation of corrugations on the surface of electroslag ingots
N75-10221
Analytical modeling of defects in solids --- including edge dislocations and microcracks
N75-10824

SURFACE FINISHING
Vibratory deburring
[BDX-613-735-REV] N75-10268
Mechanical deburring of plastics
[BDX-613-988-REV] N75-10270

SURFACE GEOMETRY
A parametric study of effect of forebody shape on flow angularity at Mach 8 --- for hypersonic aircraft
[NASA-TN-D-7768] N75-10008

SURFACE LAYERS
Some characteristics of the thermal operation of an electroslag remelting furnace crystallizer with a broadened slag top
N75-10213
Outer layers of white dwarf stars --- the relation of convection to luminousity
N75-10870

SURFACE NAVIGATION
Optimal light characteristics for battery operated navigation lights --- surface navigation beacons
[IZF-1974-8] N75-10044
An azimuth determination system using the Navy navigation satellites
[AD-784375] N75-10047
C-LAD: A low cost LORAN-C assist device. Volume 1: Hardware --- application of digital computer for increased ship navigation accuracy
[AD-784312] N75-10049
C-LAD: A low cost LORAN-C assist device. Volume 2: Software --- application of digital computer for increased ship navigation accuracy
[AD-784313] N75-10050
C-LAD: A low cost LORAN-C assist device. Volume 3: Operating procedure --- application of digital computer for increased ship navigation accuracy
[AD-784314] N75-10051

SURFACE PROPERTIES
Surface structure and applied stress in corrosion rate
[AD-783402] N75-10247
Vibratory deburring
[BDX-613-735-REV] N75-10268
Harmonic components, of the magnetic conductivity of the air gap of electric motors on a gear surface
[AD-783930] N75-10334
The 3-5 surface studies
[AD-784206] N75-10840
The III-V surface studies
[AD-784342] N75-10842

SURFACE REACTIONS
Heat resistant coatings obtained by chemical deposition from solutions
[AD-783981] N75-10183

SURFACE ROUGHNESS EFFECTS
Vibratory deburring
[BDX-613-735-REV] N75-10265

SURFACE TEMPERATURE
Atmospheric response to variations in sea surface temperature
[NASA-CR-140604] N75-10672
The Coho Project: Living resources prediction feasibility study. Volume 3: System evaluation report
[PB-234059/4] N75-10683

SURFACE WATER
Hydraulic model study of surface and subsurface wind-driven currents in Lake Ontario
N75-10515
Surface water modeling Everglades Water Basin, Florida
[E74-10814] N75-10540

SURFACE WAVES
Piezoelectric traveling wave amplifiers --- based on surface shear waves
[BMFT-FB-T-74-05] N75-10318

SURFACTANTS
The influence of surfactants on the adhesion between solids --- measurement of force of adhesion between crossed carbon filaments submerged in an aqueous buffer solution
N75-10254

SURVIVAL EQUIPMENT
Man in space orbit
[NASA-TT-F-15973] N75-10688
Cold: Physiology, protection and survival
[AGARD-AG-194] N75-10706

SWEPT WINGS
A calculation method for the turbulent boundary layer on an infinite yawed wing in compressible, adiabatic flow
[ARC-CP-1268] N75-10024
A viscous/potential flow interaction analysis method for multi-element infinite swept wings, volume 1
[NASA-CR-2476] N75-10358

SWEPTBACK WINGS
Interference of a sweptback wing and the fuselage at transonic speeds
[NASA-TT-F-15993] N75-10056

SWITCHING CIRCUITS
Production engineering measure for an Integrated Power Switch [IPS]
[AD-784317] N75-10329

SYMPHONIE SATELLITES
Dynamic simulation facility for satellite attitude control systems --- Symphonie satellite
[BMFT-FB-W-74-02] N75-10159

SYNCHRONOUS SATELLITES
Testing of NiCd cells over geostationary orbit type cycling period
[ESRO-CR[P]-504] N75-10596

SYNTHETIC ARRAYS
Synthesis of antenna arrays
[AD-784410] N75-10330

SYNTHETIC FUELS
Char oil energy development
[PB-233263/3] N75-10603

SYSTEMS ANALYSIS
An adaptive technique for a redundant-sensor navigation system
[NASA-CR-140313] N75-10042
C-LAD: A low cost LORAN-C assist device. Volume 3: Operating procedure --- application of digital computer for increased ship navigation accuracy
[AD-784314] N75-10051
Performance monitor system functional simulator, environmental data, orbiter 101[HFT]
[NASA-TM-X-72028] N75-10136
ERTS 1 flight evaluation report, 23 October 1973 - 23 January 1974 --- orbits 6371 to 7651
[NASA-CR-140712] N75-10546
ERTS 1 flight evaluation report, 23 January - 23 April 1974 --- orbits 7652 to 8907
[NASA-CR-140810] N75-10547
ERTS 1 flight evaluation report, January 23, 1973 to April 23, 1973 --- analysis of ERTS-1 systems during orbits 2600-3410
[NASA-CR-140809] N75-10548
ERTS 1 flight evaluation report, 23 April 1974 23 July 1974 --- orbits 8908 to 10182
[NASA-CR-140711] N75-10568
Methods of investigation for manual control processes
[FB-15] N75-10738

SYSTEMS ENGINEERING
T and E guidelines for aircraft systems
[AD-784549] N75-10085
Engineering studies related to the Skylab program
[NASA-CR-137473] N75-10143
Modeling and analysis of power processing systems: Feasibility investigation and formulation of a methodology
[NASA-CR-134686] N75-10150
Precision Pointing Control System [PPCS] system design and analysis --- for gimbaled experiment platforms
[NASA-CR-139132] N75-10157
Advanced heat source concepts --- module design for space electric power generation
[MLM-2134] N75-10591

T

TABLES [DATA]
Thermal diffusivity of six igneous rocks at elevated temperatures and reduced pressures
[NASA-CR-140577] N75-10562
The 16301 Little John missile no. 3194, round no. 715 RM[27 June 1974]
[AD-783472] N75-10647
The 16101 Little John, missle no. 3094, round no. 714 RM [19 June 1974]
[AD-783470] N75-10649
Tables and conversions for microclimatology
[PB-234158/4] N75-10655
Probability of illness definition for the Skylab flight crew health stabilization program
[NASA-CR-140300] N75-10691

TAIL ASSEMBLIES
Elastic pitch beam tail rotor operational suitability investigation
[AD-784595] N75-10069

TANTALUM
Investigation of tantalum wet slug capacitor failures in the Apollo telescope mount charger battery regulator modules
[NASA-CR-120497] N75-10468

TANTALUM CARBIDES
Development of high temperature materials for solid propellant rocket nozzle applications --- tantalum carbides-tungsten fiber composites
[NASA-CR-140666] N75-10165

TANTALUM NITRIDES
Effect of soldering flux on Ta2N resistors
[SLA-73-1045] N75-10317

TARGET ACQUISITION
Helicopter dropsight
[AD-784551] N75-10084
Atmospheric properties and their effect on target acquisition under flare illumination
[AD-783052] N75-10665
Principle and realization of aeronautical laser systems --- characteristics and applications of laser systems for military purposes
N75-10782

TARGET RECOGNITION
Target identification by means of low frequency radar returns
[AD-783224] N75-10293
Vehicular variable-parameter METRRA system --- performance of radar system for clutter rejection using third harmonic return of reflected radiation
[AD-782214] N75-10295
Information processing for target-detection and identification
[AD-783229] N75-10304

TARS
Quantitative determination of benzo/a/pyrene in tar-containing drugs by an isotope dilution method
[NASA-TT-F-15983] N75-10194

TDR SATELLITES
Major RFI conditions effecting TDRSS
[NASA-CR-139135] N75-10281
Preliminary assessment of RFI impacts on TDRSS in the 2- to 2.3 GHz band
[NASA-CR-139125] N75-10287
Dual S and Ku-band tracking feed for a TDRS reflector antenna
[NASA-CR-139122] N75-10312

TECHNOLOGY ASSESSMENT
Retention and application of Skylab experiences to future programs --- a postflight review of technical programs.
[NASA-TM-X-64853] N75-10126
Technology evaluation of heating, ventilation, and air conditioning for MIUS application
[NASA-TM-X-58128] N75-10135
Fire detection: The state-of-the-art --- a description of instruments for detecting outputs of the combustion process
[NASA-CR-140653] N75-10404
The application of remote sensing techniques: Technical and methodological issues
[NASA-CR-140674] N75-10564
MEGASTAR: The Meaning of Energy Growth: An Assessment of Systems, Technologies, and Requirements
[NASA-CR-120355] N75-10584

TECHNOLOGY TRANSFER
Proceeding of the Colloquium on Technology Transfer
[AD-782723] N75-10852

TECHNOLOGY UTILIZATION
Progressive methods of producing microcircuits
N75-10307
Advanced nuclear research
[GPO-41-253] N75-10764

TELECOMMUNICATION
Theoretical solutions to problems introduced by the TWA in multiple access communication systems
N75-10279

TELEMETRY
Radio-electronics and space
[AD-783968] N75-10299

TELEVISION EQUIPMENT
Opto-electronics --- application of electro-optical equipment for avionic systems
[AGARD-LS-71] N75-10774

TELEVISION SYSTEMS
An exploratory flight investigation of helicopter sling-load placements using a closed-circuit television as a pilot aid
[NASA-TN-D-7776] N75-10009
Low light television systems --- construction, operation, and application of various television systems
N75-10783

TELEVISION TRANSMISSION
Mariner Mars 1971 television picture catalog. Volume 1, addendum 1: Experiment design and picture data
[NASA-CR-140700] N75-10890

TEMPERATURE DISTRIBUTION
The evolution of electron density and temperature distributions in the topside ionosphere during magnetic storms
[NASA-TM-X-70768] N75-10621

TEMPERATURE EFFECTS
The ignition limit of a conglomerate of metal particles
[AD-782073] N75-10197
Investigation on the influence of temperature and specimen geometry on the fracture toughness properties of TiAl6V4
[ESRO-TT-75] N75-10234

TEMPERATURE GRADIENTS
Light refraction by mean temperature gradients in the near-earth atmosphere
[AD-783484] N75-10790

TENNESSEE
Geographic applications of ERTS-1 imagery to landscape change --- Mississippi River and Great Smoky Mountains of Tennessee and North Carolina
[E74-10810] N75-10537

TENNESSEE VALLEY [AL-KY-TN]
ERTS-1 imagery interpretation techniques in the Tennessee Valley --- land use and soil mapping
[E74-10811] N75-10538

TENSILE PROPERTIES
Room temperature tensile properties of titanium and seven titanium alloys prepared by skull casting
[BM-RI-7949] N75-10208

TENSILE STRENGTH
Influence of thermomechanical treatment on the tensile properties of a platinum 25 wt percent iridium alloy
[UCRL-75630] N75-10229
Tensile properties of an ultrahigh-strength graphite fiber in an epoxy matrix
[UCRL-75209] N75-10253
Technique for testing the tensile strength of thermocompression bonds
[SLA-74-93] N75-10470

TENSILE TESTS
Laboratory development and tensile testing of graphite/glass/epoxy hybrid composite materials
[AD-783860] N75-10190
A computer program for plotting stress-strain data from compression, tension, and torsion tests of materials
[NASA-TM-X-3091] N75-10485

TERMINAL GUIDANCE
Direct statistical analysis of missile guidance systems via cadet [covariance analysis describing function technique]
[AD-783098] N75-10162

TERRAIN ANALYSIS
An extension of the combinatorial geometry technique for modeling vegetation and terrain features
[AD-782883] N75-10577
The PUCE programme for terrain evaluation for engineering purposes. 2: Procedures for terrain classification
[PB-233847/3] N75-10625

TEST EQUIPMENT
Surface structure and applied stress in corrosion rate
[AD-783402] N75-10247
T and E guidelines for airborne ECM systems
[AD-784574] N75-10332
Results of thermal battery cell testing
[SLA-74-5002] N75-10589

TEST FACILITIES
NASA-Langley helicopter tower instrumentation systems
[NASA-CR-132522] N75-10106
A root locus analysis of a seismic isolation control system --- systems analysis of gyro test facility
[AD-783615] N75-10424
Activities of the European Space Tribology Laboratory --- thermal vacuum test facilities
[ESRO-ESTL-5] N75-10462
Meteorological study for Tooele Army Depot, Volume I
[AD-784572] N75-10666

TETHERED BALLOONS
Slow descent recovery system technology study and data program
[AD-783268] N75-10032

TETRYL
Critical energy for shock initiation of tetryl and A-5
[UCID-16469] N75-10260

TEXAS
An evaluation of the suitability of ERTS data for the purposes of petroleum exploration --- Anadarko Basin in Oklahoma and Texas
N75-10553

TF-30 ENGINE
Real-time simulation of the TF30-P-3 turbofan engine using a hybrid computer
[NASA-TM-X-3106] N75-10095

THAILAND
Thailand national programme of the Earth Resources Technology Satellite
[E74-10806] N75-10533
The Thailand programme of the Earth Resources Technology Satellite
[E74-10807] N75-10534
THERMAL BATTERIES
Results of thermal battery cell testing
[SLA-74-5002] N75-10589
Long-life, low-voltage, power thermal battery
[SLA-73-7069] N75-10590
THERMAL BOUNDARY LAYER
Second order boundary layer theory for steady, laminar, compressible flow on curved surfaces
[ESRO-TT-85] N75-10384
THERMAL CONDUCTIVITY
Heat transport in porous insulations at cryogenic temperatures
N75-10339
THERMAL CYCLING TESTS
Protection of glass tubes in epoxy encapsulation
[BDX-613-931-REV] N75-10188
THERMAL DEGRADATION
An experimental study of the thermal decomposition of an ablative material
N75-10015
THERMAL DIFFUSION
Thermal diffusivity of six igneous rocks at elevated temperatures and reduced pressures
[NASA-CR-140577] N75-10562
The spin-temperature theory of dynamic nuclear polarization and nuclear spin-lattice relaxation
[NASA-TR-R-427] N75-10765
THERMAL FATIGUE
Low cycle high temperature fatigue --- in aircraft jet engines: conference proceedings
[AGARD-CP-155] N75-10487
Problems of low cycle high temperature fatigue in aircraft jet engines
N75-10488
An overview of high temperature metal fatigue: Aspects covered by the 1973 International Conference on Creep and Fatigue
N75-10489
Precision in LCHTF testing --- of aircraft jet engines
N75-10490
The effect of cycle parameters on high temperature low cycle fatigue --- in aircraft jet engines
N75-10491
Lifetime prediction methods for elevated temperature fatigue --- in aircraft jet engines
N75-10493
Design procedures for elevated temperature low-cycle fatigue --- as applied to aircraft jet engines
N75-10494
THERMAL INSULATION
Heat transfer in high temperature opacified fiber insulation
[SLA-73-5677] N75-10189
Heat transport in porous insulations at cryogenic temperatures
N75-10339
THERMAL POLLUTION
Application of remote sensing for prediction and detection of thermal pollution
[NASA-CR-139182] N75-10572
THERMAL PROTECTION
Thermal-structural evaluation of TD Ni-20Cr thermal protection system panels
[NASA-CR-132487] N75-10155
THERMAL SIMULATION
Investigation of the thermal load of rooms as a result of solar radiation through windows by laboratory experiments using simulated global radiation
[DLR-FB-73-73] N75-10111
THERMAL VACUUM TESTS
Thermal vacuum qualification test of No. 1 Hawker Siddeley Dynamics low speed mechanism --- for solar paddles
[ESRO-ESTL-3] N75-10461
Activities of the European Space Tribology Laboratory --- thermal vacuum test facilities
[ESRO-ESTL-5] N75-10462
THERMOCOUPLES
Determination of the energy of pulse current by a thermo-electric converter
[AD-783561] N75-10325
THERMODYNAMIC PROPERTIES
Thermodynamics of chemical species important to rocket technology
[AD-782028] N75-10238
Evaluation of the thermal characteristics of the AN/WQC-2 final amplifier
[AD-783953] N75-10326
Accuracy of homogeneous nucleation rates determined in supersonic nozzles
[AD-784506] N75-10388
Correlation of thermodynamic properties of fluids through generalized hard sphere-augmented equation of state
N75-10843
Calculated liquid phase thermodynamic properties and liquid-vapor equilibria for fluorine-oxygen [FLOX] mixtures
[NASA-CR-140709] N75-10844
Thermodynamics of the Al-Si system
[PB-234070/1] N75-10846
THERMODYNAMICS
Nonequilibrium statistical thermodynamics
[AD-784411] N75-10847
THERMOELASTICITY
Thermoelastic heat effects in equiatomic NiTi
[RM-592] N75-10226
THERMOELECTRIC GENERATORS
Determination of the energy of pulse current by a thermo-electric converter
[AD-783561] N75-10325
Devices based on thermoelectrical phenomena
[AD-783821] N75-10836
THERMOELECTRIC POWER GENERATION
Determination of the energy of pulse current by a thermo-electric converter
[AD-783561] N75-10325
Devices based on thermoelectrical phenomena
[AD-783821] N75-10836
THERMOLUMINESCENCE
Novel materials for power systems. Part 3: Selective emitters for energy conversion
[AD-784449] N75-10608
Foil activation analysis and thermoluminescent dosimetry on Skylab 2 --- for monitoring radiation levels
[AD-783779] N75-10704
THERMOMECHANICAL TREATMENT
Influence of thermomechanical treatment on the tensile properties of a platinum 25 wt percent iridium alloy
[UCRL-75630] N75-10229
THERMONUCLEAR POWER GENERATION
Charged particle beam-plasma interactions for thermonuclear power generation
[AD-782060] N75-10812
THERMOPHYSICAL PROPERTIES
Development of an apparatus to measure thermophysical properties of wind tunnel heat transfer models
[NASA-CR-2434] N75-10104
THETA PINCH
Experimental and computational study of the low-density plasma in the outer regions of a theta pinch
[LRP-85/74] N75-10808
THICK FILMS
Effect of rapidly changing voltages on thick-film resistors
[BDX-613-1085-REV] N75-10314
THIN FILMS
Production engineering measure for thin film ratiometer
[AD-782236] N75-10423
Accelerated lifetesting of thin film tungsten contacts for a milliwatt Si-Ge thermopile --- temperature effect on sputter deposited layers
[SLA-73-1087] N75-10471
An investigation of electro-optical modulation methods in GaSs epitaxial thin film waveguides at 10.6 micron wavelength
N75-10817
THIN PLATES
Nonlinear finite-element formulation for transient analysis of three-dimensional thin structures
[ANL-8104] N75-10486
Large deflections of thin elastic plates
[AD-783047] N75-10512
THIN WALLED SHELLS
Nonlinear finite-element formulation for transient analysis of three-dimensional thin structures
[ANL-8104] N75-10486
THIOLS
Picosecond flash photolysis and spectroscopy: Bis-[4-dimethylaminodithiobenzil]--Ni[2], [BDN] --- transient absorption spectrum
[AD-781925] N75-10199
THREE DIMENSIONAL FLOW
A shock capturing method for calculating supersonic flow fields
[ARC-CP-1290] N75-10381
THROATS
Pyrolytic graphite coated throat inserts
[AD-783849] N75-10176
THRUST CHAMBERS
Space shuttle orbit maneuvering engine reusable thrust chamber program
[NASA-CR-140321] N75-10167
Fabrication of liquid-rocket thrust chambers by electroforming
[NASA-TM-X-3116] N75-10172
THRUST VECTOR CONTROL
On power conditioning for satellite stabilisation thrusters
[RAE-LIB-TRANS-1771] N75-10158
SSME/side loads analysis for flight configuration, revision A --- structural analysis of space shuttle main engine under side load excitation
[NASA-TM-X-64841] N75-10164
Mariner Mars 1971 attitude control subsystem
[NASA-CR-140706] N75-10168
Viking Orbiter 1975 thrust vector control system accuracy
[NASA-CR-140705] N75-10169
THUNDERSTORMS
Proceedings of the Waldorf Conference on Long Range Geographic Estimation of Lightning Sources
[AD-784393] N75-10624
THYRISTORS
On the operating characteristics of induction motors fed by thyristor inverters
[SERIAL-150-VOL-24-NO-1] N75-10310
Functioning of power rectifiers and thyristors from 1 January 1970 to 31 December 1972 --- noting carrier injection, emitter shorts, ignition, and breakdown
[BMFT-FB-T-74-07] N75-10319
TIDES
Computations of M sub 2 and K sub 1 ocean tidal perturbations in satellite elements
[NASA-CR-139124] N75-10851
TIN ALLOYS
Research study on materials processing in space experiment number M512: Nickel - 12 wt percent tin alloy evaluation
[NASA-CR-129038] N75-10119
TITANIUM
Study of preignition processes in zirconium, titanium, and zirconium hydride
[AD-783965] N75-10198
High temperature texture strengthening in alpha-titanium
[AD-784213] N75-10240
TITANIUM ALLOYS
Room temperature tensile properties of titanium and seven titanium alloys prepared by skull casting
[BM-RI-7949] N75-10208
The effect of the titanium content on the active corrosion of ferritic r-steels and austenitic Cr-Ni-steels in sulfuric acid
[NASA-TT-F-15994] N75-10211
Investigation on the influence of temperature and specimen geometry on the fracture toughness properties of TiAl6V4
[ESRO-TT-75] N75-10234
Dehydriding of titanium alloy [Ti-6246] hydrided powder
[AD-783235] N75-10249
The collection, generation, and analysis of MIL-HDBK-5 allowable design data --- fatigue data for aluminum alloys, titanium alloys, and steels
[AD-783616] N75-10506
TOKAMAK FUSION REACTORS
Radiation from plasmas in the ST Tokamak
[MATT-1077] N75-10802
The effects of impurities and magnetic divertors on high-temperature tokamaks
[MATT-1079] N75-10804
Two-energy component toroidal fusion devices
[MATT-1088] N75-10805
Trends in nuclear fusion research
[TRITA-EPP-74-12] N75-10807
TOLERANCES [MECHANICS]
Gradient index optics: Aspects of design, testing, tolerancing, and fabrication
N75-10770
TOPOLOGY
Topological properties of charge algebras
[RR-143/MBR/KPSBR-5] N75-10734
TOROIDAL PLASMAS
Transport and divertor studies in the FM-1 spherator
[MATT-1078] N75-10803
Two-energy component toroidal fusion devices
[MATT-1088] N75-10805
TORQUE
Zero torque gear head wrench
[NASA-CASE-NPO-13059-1] N75-10456
TORSION
A computer program for plotting stress-strain data from compression, tension, and torsion tests of materials
[NASA-TM-X-3091] N75-10485
TOWERS
NASA-Langley helicopter tower instrumentation systems
[NASA-CR-132522] N75-10106
TOXICOLOGY
A review of the toxicology research program of the 6570th Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio
[AD-782249] N75-10703
TRACE CONTAMINANTS
Transport processes and trace constituents in the stratosphere --- effects of supersonic aircraft operation on ozone distribution
[COO-2249-3] N75-10523
High purity germanium-low temperature Hall analyses
[UCRL-74832] N75-10831
TRACKING [POSITION]
NTC tracking display
[AD-783961] N75-10760
TRACKING RADAR
Real time digital control of remote tracking instruments --- tracking radar
[SLA-74-5186] N75-10418

TRAJECTORY OPTIMIZATION
Trajectory selection for the Mariner Jupiter/Saturn 1977 project
[NASA-CR-140704] N75-10142
TRANSDUCERS
Burst processor tapped delay line --- Doppler resolution filter
[AD-779473] N75-10331
Environmental control system transducer development study --- for space shuttles
[NASA-CR-140312] N75-10409
TRANSFER FUNCTIONS
Optical transfer function of NTS-1 retroreflector array
[NASA-CR-140667] N75-10773
An experiment to measure the modulation transfer function of the atmosphere in the marine boundary layer
[AD-783807] N75-10792
TRANSFORMATIONS (MATHEMATICS)
Does representative ground wind measurement exist? --- velocity data terrain transformation
[KNMI-V-257] N75-10640
TRANSFORMERS
Ferrite-core transformer bonding and potting
[BDX-613-992] N75-10315
TRANSIENT OSCILLATIONS
Determination of aerodynamic derivatives using the discrete Fourier transformation of transient oscillations
[DLR-FB-74-17] N75-10018
TRANSISTOR AMPLIFIERS
Transistorized impulse generators in the millisecond range --- characteristics of relaxation wideband generators in dipole and field transistors N75-10306
Evaluation of the thermal characteristics of the AN/WQC-2 final amplifier
[AD-783953] N75-10326
TRANSISTOR CIRCUITS
Transistorized impulse generators in the millisecond range --- characteristics of relaxation wideband generators in dipole and field transistors N75-10306
TRANSISTORS
Susceptibility of UHF RF transistors to high power UHF signals
[AD-780536/9] N75-10297
Present day status of accelerated testing of diodes and transistors
[ESRO-CR-170] N75-10475
TRANSITION METALS
Transition metal oxides: Crystal chemistry, phase transition and related aspects
[NSRDS-NBS-49] N75-10193
TRANSMISSION LINES
Digital display of characteristic parameters of active radio frequency transmission systems
[AD-783806] N75-10302
Causes for the occurrence of pulsed interference in remote-control connection circuits
[AD-783917] N75-10333
TRANSONIC FLIGHT
Interference of a sweptback wing and the fuselage at transonic speeds
[NASA-TT-F-15993] N75-10056
TRANSONIC FLOW
Aerospace Research
[ESRO-TT-40] N75-10367
Nitrogen condensation in a sonic orifice expansion flow
[AD-783254] N75-10399
TRANSONIC SPEED
Measurements of dynamic stability derivatives of an ogive delta wing model at transonic and supersonic speeds
[FFA-TN-AU-925] N75-10019
TRANSPORT AIRCRAFT
Operational effectiveness of transport aircraft
[NASA-TT-F-810] N75-10036
TRANSPORT PROPERTIES
In-situ transport measurements on UHV grown a-Ge samples
[SLA-73-7074] N75-10834
Network models of crystals
[AD-784516] N75-10835
TRANSPORTATION
An analysis of some world transport statistics
[PB-232940/7] N75-10868
TRAPS
Solar energy trap
[NASA-CASE-MFS-22744-1] N75-10586
TRAVELING WAVE AMPLIFIERS
Theoretical solutions to problems introduced by the TWA in multiple access communication systems N75-10279
Piezoelectric traveling wave amplifiers --- based on surface shear waves
[BMFT-FB-T-74-05] N75-10318
Traveling wave tube lineariser --- for communication satellites
[ESRO-CR[P]-489] N75-10323
TRAVELING WAVE TUBES
Traveling wave tube lineariser --- for communication satellites
[ESRO-CR[P]-489] N75-10323
TRIANGULATION
Skylab a proposal aerotriangulation with very small scale photography --- North Carolina and Virginia
[E74-10804] N75-10532
Comparison of various methods of flight-line three-dimensional analytic phototriangulation
[AD-783662] N75-10574
TRITIUM
Quantitative determination of benzo/a/pyrene in tar-containing drugs by an isotope dilution method
[NASA-TT-F-15983] N75-10194
TROPICAL METEOROLOGY
International operations plan for the GARP Atlantic Tropical Experiment, parts 1, 4, 6 and 7
[GATE-9-PT-1] N75-10633
General background and objectives and reference information on platform status, ship schedules and distribution N75-10634
TROPICAL REGIONS
Application of satellite cloud brightness data for large scale tropical analysis: A correlation study of brightness and 200-MB divergence
[AD-784366] N75-10652
TRUCKS
Independent truckers and the energy crisis
[GPO-31-412] N75-10581
TUNGSTEN
Development of high temperature materials for solid propellant rocket nozzle applications --- tantalum carbides-tungsten fiber composites
[NASA-CR-140666] N75-10165
Tungsten-reinforced oxidation-resistant columbium alloys
[AD-783985] N75-10192
Accelerated lifetesting of thin film tungsten contacts for a milliwatt Si-Ge thermopile --- temperature effect on sputter deposited layers
[SLA-73-1087] N75-10471
TUNGSTEN ALLOYS
Interdiffusion behavior of tungsten or rhenium and group 5 and 6 elements and alloys of the periodic table. Part 2A: Appendices A-G
[NASA-CR-134526] N75-10209
TURBIDITY
Dynamics of suspended sediment plumes in Lake Ontario
[E74-10815] N75-10541
TURBINE BLADES
Solutions to the direct problem of heat transfer between a cooled turbine blade and gas using the dispersion method
[AD-783927] N75-10099
TURBINE PUMPS
Liquid rocket engine turbopump gears
[NASA-SP-8100] N75-10166
TURBINE WHEELS
Statement of the two-dimensional nonstationary problem of thermal conductivity for a bladed wheel of a gas turbine
[AD-784709] N75-10096
TURBINES
Erosion in radial inflow turbines. Volume 3: Trajectories of erosive particles in radial inflow turbines
[NASA-CR-134700] N75-10087
TURBOCOMPRESSORS
A rational basis for circumferential distortion index formulation
[AD-783819] N75-10394
TURBOFANS
Highly loaded multi-stage fan drive turbine: Performance of final three configurations
[NASA-CR-2446] N75-10089
TURBOJET ENGINES
Shrouded impeller test program
[AD-784133] N75-10100
TURBULENCE EFFECTS
Critical review of methods to predict the buffet capability of aircraft
[AGARD-R-623] N75-10053
Turbulence induced changes in vortex shedding from a circular cylinder N75-10336
Free-stream turbulence effects on the turbulent boundary layer
[ARC-CP-1282] N75-10380
Sound turbulence interaction
[TT-7404] N75-10754
TURBULENT BOUNDARY LAYER
A calculation method for the turbulent boundary layer on an infinite yawed wing in compressible, adiabatic flow
[ARC-CP-1268] N75-10024
Remarks about the influence of density fluctuations in turbulent boundary layers for compressible flow
[NASA-TT-F-15989] N75-10353
Research on turbulent diffusion
[COO-3284-3] N75-10373
Measurements of turbulent boundary layer growth over a longitudinally curved surface
[IC-AERO-74-05] N75-10377
Free-stream turbulence effects on the turbulent boundary layer
[ARC-CP-1282] N75-10380
Influence of the side walls on the turbulent centre-plane boundary layer in a square duct
[IC-AERO-74-06] N75-10382
A multi-parameter integral method for the calculation of incompressible laminar and temperature boundary layers
[ESRO-TT-88] N75-10385
A study of the effect of pressure gradient on the eddy viscosity and mixing length for incompressible equilibrium turbulent boundary layers
[AD-783942] N75-10392
Analytical procedures used to obtain and evaluate the eddy viscosity and mixing length extracted from incompressible turbulent boundary layer data
[AD-784416] N75-10397
TURBULENT DIFFUSION
Research on turbulent diffusion
[COO-3284-3] N75-10373
TURBULENT FLOW
A calculation method for the two dimensional turbulent flow over a slotted flap
[ARC-CP-1267] N75-10023
Isolated rotor noise due to inlet distortion or turbulence
[NASA-CR-2479] N75-10094
The prediction of turbulent confined jet mixing with and without swirl N75-10345
Two-dimensional flow inside MHD ducts with transverse asymmetries N75-10364
Research on turbulent diffusion
[COO-3284-3] N75-10373
Measurements in a turbulent horseshoe vortex and the problem of probe interference
[IC-AERO-73-08] N75-10375
On the measurement of intermittency in turbulent flow
[IC-AERO-74-04] N75-10376
A rational basis for circumferential distortion index formulation
[AD-783819] N75-10394
The influence of magnetic field on turbulent flow with a shift
[AD-784702] N75-10395
Bouyancy effects on a turbulent shear flow
[AD-784438] N75-10398
TURBULENT WAKES
Intermittency, the entrainment problem --- in turbulent wake flows N75-10342
TWO DIMENSIONAL FLOW
A calculation method for the two dimensional turbulent flow over a slotted flap
[ARC-CP-1267] N75-10023
Two dimensional analysis of fluid-structure interaction by method of finite differences: hydraulic ram, the fuel tank problem
[AD-783839] N75-10068
Two-dimensional flow inside MHD ducts with transverse asymmetries N75-10364
Time-dependent methods for computing wall effects in two-dimensional supercritical flow --- over an airfoil N75-10369
TYPE 3 BURSTS
Relation between metric and decametric noise storm sources and microwave S-component emissions
[NASA-TM-X-70764] N75-10285

U

U.S.S.R.
Rivers of the past: Creators of oil
[NASA-TT-F-15974] N75-10517
Soviet bloc research in geophysics, astronomy, and space, no. 334
[JPRS-63186] N75-10518
Soviet satellite geodesy: Basis and status of Soviet laser geodesy and long-base line interferometry
[AD-781138/3] N75-10524
Overall evaluation of ERTS-1 imagery for cartographic application --- Australia, Antarctica, U.S., and U.S.S.R.
[E74-10800] N75-10528
Dust storms in the Altay territory --- U.S.S.R.
[AD-783664] N75-10643
Dust storms in the Transvolga
[AD-784174] N75-10663
UH-1 HELICOPTER
Endurance testing of an LM-726-4 elastomeric pitch change bearing
[AD-784140] N75-10074
Interservice utility helicopter reliability and maintainability comparative analysis
[AD-784177] N75-10080
Helicopter dropsight
[AD-784551] N75-10084

ULTRAHIGH FREQUENCIES
UHF amplifiers: Improvement of linearity by precorrection
[BBC-RD-1974/32] N75-10275
Simultaneous dual-band radar development
[NASA-CR-140303] N75-10283
In-harbor and at-sea electromagnetic compatibility survey for maritime satellite L-band shipboard terminal
[NASA-CR-139131] N75-10284
Susceptibility of UHF RF transistors to high power UHF signals
[AD-780536/9] N75-10297
Frequency choice for tactical satellite communications
[AD-783912] N75-10298

ULTRASONIC WELDING
Ultrasonic welding of electrical terminations
[BDX-613-1016] N75-10460

ULTRASONICS
Ultrasonic absorption by phospholipid vesicles; acoustic impedance matching and the design of broadband piezoelectric transducers
N75-10751

ULTRAVIOLET RADIATION
Development of programs for computing characteristics of ultraviolet radiation
[NASA-CR-139134] N75-10746
Test program on the contamination of ultraviolet region mirrors by Apollo Telescope Mount materials
[NASA-CR-120516] N75-10772

ULTRAVIOLET SPECTRA
Experiment S-59 conversion --- Spacelab-borne UV stellar spectrophotometer
[REPT-311.271] N75-10134

ULTRAVIOLET SPECTROMETERS
Apollo 17 ultraviolet spectrometer experiment [S-169]
[NASA-CR-140316] N75-10128

UNDERWATER ACOUSTICS
NTC tracking display
[AD-783961] N75-10760

UNDERWATER COMMUNICATION
Evaluation of the thermal characteristics of the AN/WQC-2 final amplifier
[AD-783953] N75-10326

UNDERWATER STRUCTURES
Experimental determination of hydrodynamic mass effects
[AD-781910] N75-10389

UNDERWATER TESTS
Experimental determination of hydrodynamic mass effects
[AD-781910] N75-10389
Underwater applications of acousto-optical imaging
[AD-784419] N75-10759

UNITED STATES OF AMERICA
United States earthquakes, 1972
N75-10520
Overall evaluation of ERTS-1 imagery for cartographic application --- Australia, Antarctica, U.S., and U.S.S.R.
[E74-10800] N75-10528
Utility of ERTS for monitoring the breeding habit of migratory waterfowl --- United States and Canada
N75-10557
MEGASTAR: The Meaning of Energy Growth: An Assessment of Systems, Technologies, and Requirements
[NASA-CR-120355] N75-10584
Mean precipitation-hours for the conterminous United States
[NC-98] N75-10629

UNIVERSITIES
Research highlights 1974 fiscal
[PUBL-84/7M] N75-10522

UNIVERSITY PROGRAM
The 1974 NASA-ASEE summer faculty fellowship aeronautics and space research program
[NASA-CR-120336] N75-10745

UNSTEADY FLOW
Micro-electric motors running on a pulsating current on constant voltage
N75-10308
Numerical modeling of unsteady flow with natural and forced separation
N75-10338
On the measurement of intermittency in turbulent flow
[IC-AERO-74-04] N75-10376

UPPER ATMOSPHERE
The 12808 Lance, missile no. 2212, round no. 235 APT [18 July 1974]
[AD-783476] N75-10644
The 12813A Lance, missile no. 2189, round no. 233 ECL [12 July 1974]
[AD-783475] N75-10645
The 14810A Lance missile nos. 2559/2561, round nos. 231 APT/232 APT [11 July 1974]
[AD-783474] N75-10646
The 12810 Lance, missile no. 2172, round no. 228 ECT [13 June 1974]
[AD-783468] N75-10648

UPWELLING WATER
Coastal upwelling ecosystems analysis. Data report 13: Radiation measurements off the Oregon coast July/August 1973
[PB-233958/8] N75-10676

URBAN PLANNING
Investigation of land use of northern megalopolis using ERTS-1 imagery
[NASA-CR-2459] N75-10545

URBAN TRANSPORTATION
Cabtrack: Communications and control instrumentation for a one-fifth scale test track
[RAE-TR-73169] N75-10867

USER MANUALS [COMPUTER PROGRAMS]
HAL/S-360 user's manual
[NASA-CR-140255] N75-10102
OAO 2/Wisconsin Experiment Package [WEP] photometer users guide
[NASA-TM-X-72533] N75-10410
Analysis of chemical lasers. Volume 1: Laser and mixing program lamp theory and user's guide
[AD-784531] N75-10449
Analysis of chemical lasers. Volume 4: Method of characteristics laser and mixing program [MOCLAMP] theory and user's guide
[AD-784534] N75-10452
SPAR reference manual --- for stress analysis
[NASA-CR-120504] N75-10495
SPAR demonstration problems --- for stress analysis
[NASA-CR-120505] N75-10496
User's guide to auxiliary programs for the Mintz-Arakawa atmospheric model
[AD-784443] N75-10660
Using the OCS complot DP-1 plotter
[NASA-CR-140602] N75-10722

UTILITIES
Technology evaluation of heating, ventilation, and air conditioning for MIUS application
[NASA-TM-X-58128] N75-10135

UTILIZATION
Effective utilization of solar energy to produce clean fuel
[PB-233956/2] N75-10605

V

V/STOL AIRCRAFT
Ground effect for V/STOL aircraft configurations and its simulation in the wind tunnel. Part 3: The tangentially blown ground as an alternative to a moving ground: Application to the NASA-Ames 40 by 80-foot wind tunnel
[NASA-CR-114497] N75-10005
Optimal control theory investigation of proprotor/wing response to vertical gust
[NASA-TM-X-62384] N75-10057
Reliability of laboratory tests of VSTOL and other long duration noises
[NASA-CR-2471] N75-10093
Experience with the NRC 10 feet by 20 feet V/STOL propulsion tunnel: Some practical aspects of V/STOL engine model testing
[DME/NAE-1973[2]] N75-10107

VACCINES
Oral and respiratory immunization
[MBL-1974-4] N75-10698

VEGETATION
Developing processing techniques for Skylab data --- vegetation and soil identification
[E74-10799] N75-10527
An interdisciplinary analysis of multispectral satellite data for selected cover types in the Colorado Mountains, using automatic data processing techniques
[E74-10803] N75-10531
A study to explore the use of orbital remote sensing to determine native arid plant distribution --- Arizona Regional Ecological Test Site
[E74-10818] N75-10544
An extension of the combinatorial geometry technique for modeling vegetation and terrain features
[AD-782883] N75-10577
Effective utilization of solar energy to produce clean fuel
[PB-233956/2] N75-10605

VEHICULAR TRACKS
Cabtrack: Communications and control instrumentation for a one-fifth scale test track
[RAE-TR-73169] N75-10867

VELOCITY DISTRIBUTION
Generation of velocity profiles using screens of nonuniform solidity
N75-10362
On the measurement of intermittency in turbulent flow
[IC-AERO-74-04] N75-10376

VELOCITY MEASUREMENT
Flow tracing fidelity of scattering aerosol in laser Doppler velocimetry
[NASA-CR-140671] N75-10357
A detection system with two photomultiplier units for measurement of projectile terminal velocity
[PHL-1974-22] N75-10421
Autocorrelation and spectral methods of measuring speed of motion
[AD-783973] N75-10422

VENTILATION
Technology evaluation of heating, ventilation, and air conditioning for MIUS application
[NASA-TM-X-58128] N75-10135

VERTICAL AIR CURRENTS
Optimal control theory investigation of proprotor/wing response to vertical gust
[NASA-TM-X-62384] N75-10057

VERTICAL TAKEOFF AIRCRAFT
Optimum transient response characteristic of a VTOL aircraft with direct side force control --- jet control for optimization of VTOL aircraft flight characteristics
[DLR-FB-73-72] N75-10103

VIBRATION DAMPING
Techniques for improving the stability of soft in-plane hingeless rotors
[NASA-TM-X-62390] N75-10058
Added mass and damping of a vibrating rod in confined viscous fluids
[ANL-CT-75-08] N75-10349
Free and forced vibration of rectangular plate with damping and arbitrary boundary conditions
N75-10481

VIBRATION EFFECTS
Centaur feedline dynamics study using power spectral methods --- fundamental mode resonant frequencies of RL-10 oxygen and hydrogen feed lines
[NASA-TM-X-3111] N75-10171
Mechanical deburring of plastics
[BDX-613-988-REV] N75-10270

VIBRATION MEASUREMENT
Centaur feedline dynamics study using power spectral methods --- fundamental mode resonant frequencies of RL-10 oxygen and hydrogen feed lines
[NASA-TM-X-3111] N75-10171

VIBRATION TESTS
Added mass and damping of a vibrating rod in confined viscous fluids
[ANL-CT-75-08] N75-10349
Aerospace Research
[ESRO-TT-40] N75-10367
Determination of the dynamic characteristics of a structure from a vibration test performed with only one excitation point --- exemplified for aircraft structures
N75-10371

VIDICONS
Low light television systems --- construction, operation, and application of various television systems
N75-10783

VIKING LANDER SPACECRAFT
Flight tests of Viking parachute system in three Mach number regimes. 1: Vehicle description, test operations, and performance
[NASA-TN-D-7692] N75-10147

VIKING ORBITER SPACECRAFT
Experimental and analytical research on a two megawatt, high performance MHD generator
[AD-783267] N75-10610

VIKING ORBITER 1975
Viking Orbiter 1975 thrust vector control system accuracy
[NASA-CR-140705] N75-10169

VIRGINIA
Skylab a proposal aerotriangulation with very small scale photography --- North Carolina and Virginia
[E74-10804] N75-10532
Remote sensing applications in marine science programs at VIMS
[NASA-CR-137475] N75-10566

VISCOELASTICITY
The stability of parallel flows between plane boundaries of two superposed viscoelastic fluids
N75-10337

VISCOUS FLOW
The nature, development and effect of the viscous flow around an aerofoil with high-lift devices
[ARC-CP-1258] N75-10021
A viscous/potential flow interaction analysis method for multi-element infinite swept wings, volume I
[NASA-CR-2476] N75-10358

VISCOUS FLUIDS
The hydrodynamic impact of a falling body upon a viscous incompressible fluid
N75-10341
Added mass and damping of a vibrating rod in confined viscous fluids
[ANL-CT-75-08] N75-10349

VITREOUS MATERIALS
NRL progress report, February 1974 --- research on the structure of matter
[PB-233883/8] N75-10749

VOLT-AMPERE CHARACTERISTICS
Long-life, low-voltage, power thermal battery
[SLA-73-7069] N75-10590

VORTEX RINGS
Vortex ring generated level differences in superfluid helium
N75-10818

VORTICES
Study of the feasibility of using a sailplane as an instrument platform for the study of wake vortex phenomena
[NASA-CR-140603] N75-10086
Vapor screen techniques development at the Ballistic Research Laboratories
[AD-784077] N75-10116
Turbulence induced changes in vortex shedding from a circular cylinder
N75-10336
Measurements in a turbulent horseshoe vortex and the problem of probe interference
[IC-AERO-73-08] N75-10375
A rational basis for circumferential distortion index formulation
[AD-783819] N75-10394

W

WALL FLOW
Aerospace Research
[ESRO-TT-40] N75-10367
Time-dependent methods for computing wall effects in two-dimensional supercritical flow --- over an airfoil
N75-10369
Measurements of turbulent boundary layer growth over a longitudinally curved surface
[IC-AERO-74-05] N75-10377
WALL TEMPERATURE
Indirect determination of specific heat fluxes in the crystallizer wall during EShP
N75-10214
WARPAGE
The design of a series of warped slender wings for subsonic speeds
[ARC-CP-1263] N75-10022
WASHINGTON
Evaluate ERTS imagery for mapping and detection of changes of snowcover on land and on glaciers --- Alaska and Washington
[E74-10812] N75-10539
WASTE DISPOSAL
Integrated pneumatic transporter-incinerator-afterburner subsystem development --- for spacecraft waste disposal
[NASA-CR-140686] N75-10457
WASTE ENERGY UTILIZATION
Recycling of plastics from urban and industrial refuse
[BM-RI-7955] N75-10267
WATER CONSUMPTION
The economics of using wind power for electricity supply in the Netherlands and for water supply on Curacao
[NASA-TT-F-15982] N75-10587
WATER CURRENTS
Hydraulic model study of surface and subsurface wind-driven currents in Lake Ontario
N75-10515
WATER EROSION
Dynamics of suspended sediment plumes in Lake Ontario
[E74-10815] N75-10541
WATER INJECTION
Profitability analysis of producing crude oil by waterflooding using a simulation technique --- computer estimated costs of water injection technique
[BM-IC-8652] N75-10582
WATER MANAGEMENT
Water resources --- monitoring and management from ERTS-1 data
N75-10559
WATER POLLUTION
Laser Raman spectroscopy of solutes dissolved in water from a remote platform
[PB-233432/4] N75-10202
A study of a dual polarization laser backscatter system for remote identification and measurement of water pollution
[NASA-CR-140665] N75-10563
WATER RESOURCES
Geologic and mineral and water resources investigations in Western Colorado, using Skylab EREP data
[E74-10802] N75-10530
Surface water modeling Everglades Water Basin, Florida
[E74-10814] N75-10540
ERTS program of the US Army Corps of Engineers --- water resources
N75-10554
Utility of ERTS for monitoring the breeding habit of migratory waterfowl --- United States and Canada
N75-10557
Water resources --- monitoring and management from ERTS-1 data
N75-10559
Jemez atmospheric water resources research project, Volume 1: Summary and accomplishments --- cloud seeding evaluation
[PB-234005/7] N75-10657
Jemez atmospheric water resources research project. Volume 2: Special aspects of the program
[PB-234006/5] N75-10658
WATER VAPOR
Infrared water vapor and temperature profiler
[AD-783984] N75-10661
WATER WAVES
Lake Erie international jetport model feasibility investigation. Report 1: Scope of study and review of available data
[AD-783463] N75-10114
Experimental determination of hydrodynamic mass effects
[AD-781910] N75-10389
Magnetic variations caused by wind waves
[AD-783944] N75-10626
Bistatic radar sea state monitoring
[NASA-CR-137469] N75-10673
Bibliography of Soviet material on internal waves, January - March 1974
[AD-782018] N75-10675
WATERSHEDS
Some statistical analyses of Hawaiian rainfall
[PB-233674/1] N75-10656
WAVE PROPAGATION
Propagation of waves in elliptic ducts. A theoretical study --- in view of jet engine compressor noise reduction
[NASA-CR-140652] N75-10378
Turbulence studies on a high-altitude sounding aircraft --- studies of convective processes turbulence, and wave propagation in the atmosphere
[NASA-TT-F-16003] N75-10622
WAVEGUIDE WINDOWS
Low loss window materials for chemical lasers
[AD-784326] N75-10433
WAVEGUIDES
Acoustic grazing flow impedance using waveguide principles
[NASA-CR-120848] N75-10351
Quasi-optical methods for waveguides and resonators
N75-10768
An investigation of electro-optical modulation methods in GaSs epitaxial thin film waveguides at 10.6 micron wavelength
N75-10817
WEAPON SYSTEMS
Head-up display optics --- application to weapon aiming systems in military aircraft
N75-10780
Principle and realization of aeronautical laser systems --- characteristics and applications of laser systems for military purposes
N75-10782
WEATHER FORECASTING
Mean precipitation-hours for the conterminous United States
[NC-98] N75-10629
General background and objectives and reference information on platform status, ship schedules and distribution
N75-10634
The Coho Project: Living resources prediction feasibility study, volume 1 --- meteorological forecasting of fish concentrations
[PB-234057/8] N75-10681
The Coho Project: Living resources prediction feasibility study. Volume 2: Environmental report
[PB-234058/6] N75-10682
WEATHER MODIFICATION
Characteristics of frontal cloud layers suitable for influence
[AD-783977] N75-10631
WEATHER STATIONS
Service C weather schedules
[FAA-7330.7I] N75-10630
WEIGHTLESSNESS
Statokinetic reactions of man under conditions of short term weightlessness
[AD-784142] N75-10705
WELD TESTS
The effects of welding and various postweld treatments on the low-cycle fatigue behavior of 5086-H116 and 5456-H117 aluminum alloys
[AD-784392] N75-10509
WELDED JOINTS
Apparatus for measuring the ferrite content of austenitic stainless steel weld material
[NASA-CASE-MFS-22907-1] N75-10210
WEST INDIES
The economics of using wind power for electricity supply in the Netherlands and for water supply on Curacao
[NASA-TT-F-15982] N75-10587
WETLANDS
Skylab-EREP investigations of wetlands ecology --- New Jersey and Chesapeake Bay
[E74-10816] N75-10542
WHITE DWARF STARS
Outer layers of white dwarf stars --- the relation of convection to luminousity
N75-10870
WIDEBAND COMMUNICATION
Development of a wideband pulse quaternary modulation system --- for an operational 400 Mbps baseband laser communication system
[NASA-CR-139129] N75-10288
WILDLIFE
Utility of ERTS for monitoring the breeding habit of migratory waterfowl --- United States and Canada
N75-10557
WIND DIRECTION
Magnetic variations caused by wind waves
[AD-783944] N75-10626
WIND EFFECTS
Hydraulic model study of surface and subsurface wind-driven currents in Lake Ontario
N75-10515
WIND EROSION
Dust storms in the Altay territory --- U.S.S.R.
[AD-783664] N75-10643
WIND TUNNEL APPARATUS
Development of an apparatus to measure thermophysical properties of wind tunnel heat transfer models
[NASA-CR-2434] N75-10104
WIND TUNNEL MODELS
A study of the damping characteristics on models of supersonic air lines at supersonic speeds
[AD-784259] N75-10077
Development of an apparatus to measure thermophysical properties of wind tunnel heat transfer models
[NASA-CR-2434] N75-10104
Aerodynamic results of support system interference effects tests conducted in NASA/ARC 6 by 6-foot supersonic wind tunnel using an 0.015-scale model of the configuration 140A/B SSV orbiter [OA59], volume 1
[NASA-CR-134410] N75-10108
Aerodynamic results of support system interference effects tests conducted in NASA/ARC 6 by 6-foot supersonic wind tunnel using a 0.015 scale model of the configuration 140A/B SSV orbiter, volume 2
[NASA-CR-134412] N75-10109
Results of reaction control system on-orbit jet simulation using an 0.0175-scale configuration 3 space shuttle orbiter model [21-0] in the LaRC 60-foot vacuum sphere
[NASA-CR-134415] N75-10170
WIND TUNNEL STABILITY TESTS
Static stability characteristics of the space shuttle external tank [MSFC model 458] during reentry in the MSFC 14-inch TWT [TA1F]
[NASA-CR-134420] N75-10151
Results of reaction control system on-orbit jet simulation using an 0.0175-scale configuration 3 space shuttle orbiter model [21-0] in the LaRC 60-foot vacuum sphere
[NASA-CR-134415] N75-10170
WIND TUNNEL TESTS
Wind tunnel tests of modified cross, heminflo, and disk-gap-band parachutes with emphasis in the transonic range
[NASA-TN-D-7759] N75-10007
Analysis of spectral density curves in wind tunnel flutter measurements
N75-10017
Results of a series of wind tunnel tests on the victor B.Mk.2 aircraft and a comparison with drag estimates and full scale flight data
[ARC-CP-1283] N75-10026
Experience with the NRC 10 feet by 20 feet V/STOL propulsion tunnel: Some practical aspects of V/STOL engine model testing
[DME/NAE-1973[2]] N75-10107
Effects of air breathing engine plumes on SSV orbiter subsonic wing pressure distribution, volume 2
[NASA-CR-134417] N75-10153
Space shuttle orbit maneuvering engine reusable thrust chamber program
[NASA-CR-140321] N75-10167
An inlet analysis for the NASA hypersonic research engine aerothermodynamic integration model
[NASA-TM-X-3038] N75-10348
Results of an investigation of hypersonic viscous interaction effects on an 0.01 scale space shuttle orbiter 51-0 model in the AEDC-VKE hypervelocity wind tunnel
[NASA-CR-134423] N75-10360
Measurements of turbulent boundary layer growth over a longitudinally curved surface
[IC-AERO-74-05] N75-10377
Influence of the viscous interaction parameter on the aerodynamic coefficients and on the heat transfer of a reentry body at very low densities for the whole region of angle of attack
[ESRO-TT-95] N75-10387
WIND TUNNEL WALLS
Time-dependent methods for computing wall effects in two-dimensional supercritical flow --- over an airfoil
N75-10369
WIND VELOCITY
Meteorological study for Toosle Army depot, volume 2
[AD-784573] N75-10667

WIND VELOCITY MEASUREMENT
Does representative ground wind measurement exist? p-- velocity data terrain transformation
[KNMI-V-257] N75-10640
WINDMILLS [WINDPOWERED MACHINES]
Standardized wind electric power unit
[AD-783764] N75-10598
WINDOWS
Investigation of the thermal load of rooms as a result of solar radiation through windows by laboratory experiments using simulated global radiation
[DLR-FB-73-73] N75-10111
WINDPOWER UTILIZATION
The economics of using wind power for electricity supply in the Netherlands and for water supply on Curacao
[NASA-TT-F-15982] N75-10587
WING FLAPS
A calculation method for the two dimensional turbulent flow over a slotted flap
[ARC-CP-1267] N75-10023
WING OSCILLATIONS
Lifting surface theory applied to fixed wings and propellers
N75-10016
WING PLANFORMS
Application of the polar coordinate method to oscillating wing configurations
[SAAB-TN-69] N75-10010
WINDOWAC [Wing Design Optimization With Aeroelastic Constraints]: Program manual
[NASA-TM-X-3071] N75-10484
WINGS
Effects of air breathing engine plumes on SSV orbiter subsonic wing pressure distribution, volume 2
[NASA-CR-134417] N75-10153
WIRE
Removal of insulation from multiconductor wire tape using a carbon dioxide laser
[BDX-613-887-REV] N75-10437
Insulation removal from woven-wire tape --- chemical and laser stripping
[BDX-613-1067-REV] N75-10438
WIRE BRIDGE CIRCUITS
Methodology for computation of interface parameters of a hot-wire explosive device from the electrothermal response analog
[SLA-73-1034] N75-10261
WIRE CLOTH
Some icing tests on selected screen samples --- made of wire and the protection of engines
[LTR-ENG-17] N75-10090
WRENCHES
Zero torque gear head wrench
[NASA-CASE-NPO-13059-1] N75-10456
WYOMING
Preliminary evaluation of underground coal gasification at Hanna, Wyoming
[BM-TPR-82] N75-10599

X

X RAY DENSITY MEASUREMENT
A simple method for the generation of organ and vessel contours from roentgenographic or fluoroscopic images
[NASA-CR-140685] N75-10693
X RAY SOURCES
Accretion flows onto galactic X-ray sources
N75-10898

Y

YAG LASERS
Development and astronomical application of a high quantum efficiency infrared upconverter
[NASA-CR-140679] N75-10791
YAW
A calculation method for the turbulent boundary layer on an infinite yawed wing in compressible, adiabatic flow
[ARC-CP-1268] N75-10024
Analysis and design of a fixed-wheel attitude stabilization system for a stationary satellite --- performance comparisons between systems with and without yaw sensors
[UTIAS-188] N75-10149
YTTRIUM-ALUMINUM GARNET
ND-doped mixed crystal laser material research
[AD-783842] N75-10445

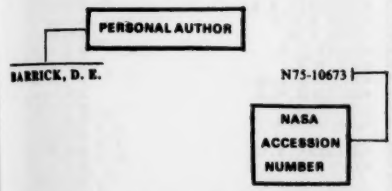
Z

ZINC ALLOYS
Structure dependence of high temperature deformation of metals
[SU-326-P-17-X-5] N75-10498
ZINC SELENIDES
Molecular beam epitaxy of 2-4 compound waveguides
[AD-784650] N75-10837
ZINC TELLURIDES
Molecular beam epitaxy of 2-4 compound waveguides
[AD-784650] N75-10837
ZIRCONIUM
Study of preignition processes in zirconium, titanium, and zirconium hydride
[AD-783965] N75-10198
ZIRCONIUM HYDRIDES
Study of preignition processes in zirconium, titanium, and zirconium hydride
[AD-783965] N75-10198

PERSONAL AUTHOR INDEX

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS VOLUME 13 NUMBER 01

TYPICAL PERSONAL AUTHOR INDEX LISTING



Listings in this index are arranged alphabetically by personal author. The NASA accession number denotes the number by which the citation is identified.

A

ABKHAZI, V. V. N75-10606
ABRAMOV, K. K. N75-10333
ABRAMOVICH, G. N. N75-10395
ACKERMAN, R. A. N75-10446
ACTON, R. U. N75-10189
ADAM, M. J. N75-10267
AGARWAL, B. N75-10497
AGGARWAL, A. K. N75-10729
AHRENS, T. J. N75-10431
AKIMOV, N. M. N75-10631
ALBERTINE, J. R. N75-10047
N75-10653
ALERS, P. B. N75-10627
ALEXANDER, M. R., JR. N75-10792
ALEXANDER, W. C. N75-10007
ALICH, J. A., JR. N75-10605
ALLEN, J. M. N75-10356
ALSCHULER, W. R. N75-10873
ALSID, L. J. N75-10542
ANANYEV, I. V. N75-10052
ANDERSON, D. F. N75-10418
ANDERSON, R. R. N75-10542
ANDERSON, R. V. N75-10624
ANDO, K. N75-10803
ANDREEV, T. N75-10177
ANDREWS, E. H., JR. N75-10348
ANDREWS, L. C. N75-10716
ANDREYEV, V. P. N75-10222
ANDRONIK, K. N75-10685
ANGELL, C. A. N75-10257
ANTIPOV, I. T. N75-10574
ARAKI, J. I. N75-10483
ARCELLA, F. G. N75-10209
ARDELL, A. J. N75-10232
ARGO, W. V. N75-10721
ARGYROPOULOS, G. S. N75-10364
ARIFOV, U. A. N75-10597
ARISTOVSKAYA, T. V. N75-10565
ARMANTROUT, G. A. N75-10831
ARMSTRONG, D. L. N75-10351
ARMSTRONG, W. A. N75-10611
ARNOLD, D. N75-10773
ARTAMONOV, V. L. N75-10216
ASHILL, P. R. N75-10021
ASIALA, C. F. N75-10066
N75-10067
ATLAS, R. N75-10672
ATWELL, B. H. N75-10555
AUSTIN, A. E. N75-10225
AUSTIN, A. L. N75-10593
AUSTIN, J. D. N75-10772

B

BACHOUR, F. N75-10387
BADAYEVA, T. A. N75-10204
BAEHR, K. N75-10322
BAGLAY, V. M. N75-10213
N75-10216
BAGLEY, R. N75-10218
BAILY, N. A. N75-10063
BAKER, D. J. N75-10693
BAKHRAKH, L. D. N75-10485
BALDOCK, J. C. A. N75-10433
BALDWIN, A. R. N75-10029
BALES, C. W. N75-10590
BANDYK, I. A. N75-10312
BANKSTON, B. F. N75-10856
BARANOVSKAYA, A. V. N75-10210
BARFIELD, B. F. N75-10519
BARNES, G. R. N75-10745
BARNETT, K. M. N75-10700
BARONI, G. N75-10336
BARRETT, C. R. N75-10767
BARRICK, D. E. N75-10498
BARTLEMA, H. C. N75-10673
BARYTSNIKOVA, G. V. N75-10698
BASKARAN, S. N75-10465
BASOV, N. G. N75-10378
BASTON, D. W. N75-10454
BATNI, R. P. N75-10160
BAXA, E. G., JR. N75-10740
BEAN, E. C. N75-10041
BECKER, J. N75-10327
BECKETT, C. W. N75-10781
BECKLIN, E. E. N75-10238
BEHN, R. N75-10882
BELLAVANCE, D. W. N75-10321
BELLINGER, K. B. N75-10445
BELYTSCHKO, T. B. N75-10426
BENDURA, R. J. N75-10486
BENNETT, A. G. N75-10147
BENT, R. B. N75-10314
BERGIN, J. M. N75-10624
N75-10626
BERK, H. L. N75-10627
BERKMAN, R. M. N75-10805
BERKOVSKAYA, K. F. N75-10712
BERNSTEIN, F. C. N75-10789
BERNSTEIN, H. J. N75-10716
BEVILAQUA, P. M. N75-10716
BHANSALI, K. J. N75-10342
BHASKARARAO, K. P. S. N75-10247
BHASKARARAO, M. N75-10734
BIERTUMPEL, E. N75-10734
BIESS, J. J. N75-10110
BIRLA, N. N75-10150
BISAGA, J. J. N75-10249
BISBEE, D. S. P. N75-10291
BITZBERGER, J. C. N75-10677
BLACKWELL, R. H. N75-10068
BLAKE, R. G. N75-10075
BLANK, H. A. N75-10719
BLOETSCHER, F. N75-10291
BODENHEIMER, R. E. N75-10032
BOGACHENKO, A. G. N75-10538
BOHLEN, H. N75-10216
BOLSTAD, J. H. N75-10324
BONDARENKO, G. G. N75-10732
BONI, A. A. N75-10242
BORIS, J. P. N75-10436
BORISEVICH, N. A. N75-10816
BOROVKO, A. I. N75-10744
BOSSEL, U. N75-10220
BOURGEOIS, S. V. N75-10761
N75-10117
BOVA, N. V. N75-10120
BOYD, R. M. N75-10663
BOYKO, G. A. N75-10599
N75-10217
BRADLEY, G. S. N75-10223
BRADSHAW, P. N75-10665
N75-10376
BRADY, J. J., III N75-10382
BRAGINSKII, V. B. N75-10760
BRAMMER, W. G. N75-10796
BRANDENBURG, C. F. N75-10311
BRANDS, E. R. N75-10599
BRANTLEY, L. W., JR. N75-10479
N75-10585
N75-10586
BRANTMAN, R. N75-10510
BRETZ, N. N75-10802
BREWER, E. B. N75-10154
BRIEN, J. J. N75-10681
BRIGGS, D. E. N75-10600
N75-10604
BRIGHT, A. W. N75-10174
BRIGHT, R. G. N75-10404
BROCKMAN, C. L., JR. N75-10742
BRODERSON, A. B. N75-10709
BRODNAX, C. T. N75-10071
N75-10072
BRONFIN, B. R. N75-10447
BROOK, J. W. N75-10829
BROOKMAN, A. K. N75-10145
BROOKS, J. N75-10577
BROWN, A. J. N75-10291
BROWN, C. N75-10175
BROWN, C. W. N75-10202
BROWN, G. W. N75-10819
BROWN, J. M. N75-10655
BROWN, R. L. N75-10883
BRUCE, C. F. N75-10815
BRUDNICKI, M. J. N75-10409
BRUKHANOV, V. N75-10887
BRUMAN, Z. I. N75-10508
BRUNETAUD, R. N75-10488
BRUNGART, D. L. N75-10757
BRUNI, F. J. N75-10445
BRUNT, P. N75-10476
N75-10477
BRUTON, W. M. N75-10095
BUERGER, A. N75-10252
BUFF, J. S. N75-10898
BUNDE, R. N75-10365
BUNK, W. N75-10187
BURGESS, E. N75-10130
BURTSCHER, J. N75-10319
BURYKINA, A. L. N75-10466
BUSH, D. M. N75-10589
BUSH, T. F. N75-10411
BUSHAW, B. A. N75-10199
BYCHKOV, V. P. N75-10710
BYER, H. H. N75-10841
BYKOV, V. V. N75-10294
BYRNE, R. J. N75-10566
BYVIK, C. E. N75-10765

C

CAINE, P. N75-10381
CALDWELL, E. O. N75-10005
CALVERT, E. D. N75-10208
CAMERON, J. R. N75-10694
N75-10695
N75-10696
CAMPAGNA, A. W. N75-10079
CAMPBELL, G. G. N75-10599
CAMPBELL, J. H., II N75-10108
N75-10109
CAMPILLO, A. J. N75-10439
CAPPELLINI, V. N75-10717
CAREY, R. F. N75-10818
CARLOCK, J. K. N75-10854
CARLSON, G. A. N75-10470
CARLSON, P. E. N75-10666
N75-10667
CARMICHAEL, A. D. N75-10464
CARPENTER, B. N75-10439
CARSON, G. T., JR. N75-10195
CARTER, L. S. N75-10830
CARTER, M. C. N75-10736
CARTER, P. B. N75-10704
CARTER, V. P. N75-10542
CARUSO, V. P. N75-10459
CASEY, H. B. N75-10423
CHABANNES, F. N75-10782
CHALMERS, B. N75-10602
CHAN, Y. W. T. N75-10763
CHANG, C. P. N75-10652
CHAO, C. M. N75-10448
CHAPPELL, M. S. N75-10090
CHARLES, T. G. N75-10472
N75-10473
N75-10474
N75-10475
N75-10478
CHATTOPADHYAY, S. N75-10309
CHEKOTILO, L. V. N75-10219
CHEN, C. H. N75-10480
CHEN, L. W. N75-10768

CHEN, S. S. N75-10349
CHEN, W. L. N75-10350
CHENG, E. D. H. N75-10656
CHEOSAKUL, P. N75-10533
N75-10534
CHERNYKH, V. V. N75-10222
CHEROG, G. G. N75-10514
CHERRY, D. G. N75-10089
CHI, B. W. N75-10392
CHIAO, T. T. N75-10253
CHIEN, T. T. N75-10042
CHILDS, I. N75-10434
CHIVILIKHIN, S. A. N75-10197
CHORLEY, R. A. N75-10780
CHOU, H. L. N75-10119
CHUPP, E. L. N75-10139
CIESLUK, A. J. N75-10389
CLARK, A. L., JR. N75-10469
CLARK, F. N75-10069
CLAYSMITH, C. R. N75-10661
CLAYTON, C. A. N75-10618
CLEVENGER, W. B., JR. N75-10087
CLIFF, R. A. N75-10821
CLOTFELTER, W. N. N75-10210
CLUMPNER, J. A. N75-10388
COCKCROFT, M. G. N75-10491
COCKS, G. W. N75-10133
COELVER, L. E. N75-10179
COFFMAN, J. L. N75-10520
COHEN, H. D. N75-10436
COKER, A. E. N75-10540
COLE, J. H. N75-10759
COLE, K. D. N75-10621
COLE, R. I. N75-10852
COLLINS, A. G. N75-10525
COLLINS, J. A. N75-10073
COLONELL, J. M. N75-10389
COMMERFORD, G. L. N75-10075
COMPARIN, R. A. N75-10396
CONN, J. S. N75-10544
CONTENSOU, P. N75-10368
COOKE, N. N75-10043
CORDES, E. H. N75-10540
CORONITI, F. V. N75-10889
CORPS, R. J. N75-10783
CORRSIN, S. N75-10373
COVOCORESSES, A. P. N75-10528
CRAIG, R. P. N75-10076
CROSBY, D. N75-10890
CROSBY, S. R. N75-10493
CROWLEY, J. D. N75-10820
CUNNOLD, D. M. N75-10523
CURLIN, J. W. N75-10617
CUSTER, R. L. P. N75-10404

D

DAHLBERG, E. N75-10806
DAILEDA, J. J. N75-10148
DANEY, D. E. N75-10266
DANIELSON, R. E. N75-10878
DANNHAEUSER, F. N75-10319
DARLEY, H. M. N75-10826
DAT, B. N75-10016
N75-10371
DAVE, J. V. N75-10746
DAVIES, P. J. N75-10022
DAVIS, J. G., JR. N75-10485
DAVIS, R. C. N75-10497
DAVIS, S. N75-10803
DEBREDERODE, V. N75-10382
DECKER, C. E. N75-10618
DEIASI, R. N75-10186
DEKKER, H. N75-10254
DELAMORINIERE, T. N75-10637
DEMETRIADES, S. T. N75-10364
DEMIN, V. V. N75-10307
DENDY, J. E., JR. N75-10731
DENISON, E. E. N75-10096
DENNISON, E. W. N75-10408
DEPIERRE, V. N75-10249
DERGUNOVA, V. S. N75-10463
DEROSSET, W. S. N75-10191
DESTUYNDER, R. N75-10017
DEWIT, M. N75-10445
DEWITT, D. N75-10608
DEY, A. N. N75-10607
DICARLO, D. J. N75-10009
DIERKE, R. N75-10110
DIETZMAN, W. D. N75-10582
DILIBERTO, S. N75-10767
DIMOCK, D. N75-10802
DIVINE, N. N75-10712
DOBASHI, S. N75-10752
DOBBS, M. E. N75-10093
DOBSON, M. D. N75-10025
DOLEZALEK, H. N75-10624
DONALDSON, A. B. N75-10189
DONELAN, L. N75-10458
DORDAIN, J. J. N75-10372
DOSS, E. D. N75-10364
DOUGLAS, B. C. N75-10413
N75-10567
DOUGLAS, T. B. N75-10238
DOUKLIAS, N. N75-10728
DOWNS, C. P. N75-10394
DRAMSTAD, S. N75-10473
DROBYSHEV, F. V. N75-10576
DUCKWORTH, W. H. N75-10256
DUDINOV, V. N. N75-10405
DURHAM, D. L. N75-10114
DUSCHA, R. A. N75-10172
DVECHS, D. F. N75-10804
DVORAK, F. A. N75-10358
DYER, J. S. N75-10142

E

EDEL, P. O. N75-10701
EDELSTEIN, F. N75-10347
EDGINGTON, L. N. N75-10065
EDMUNDS, R. S. N75-10168
EDWARDS, C. R. N75-10049
N75-10050
N75-10051
EDWARDS, R. M. N75-10755
EFIMOV, A. B. N75-10505
EFIMOV, V. A. N75-10662
EHN, G. N75-10019
EIDINOFF, H. L. N75-10155
EISENBERG, N. A. N75-10337
EISENHUT, D. F. N75-10157
EJIMA, S. N75-10803
ELANGO, M. N75-10201
ELDER, B. M. N75-10718
ELDER, D. J. N75-10360
ELIAS, P. N75-10727
ELROD, H. G. N75-10391
ELSNER, R. F. N75-10295
EMANUEL, G. N75-10446
EMBURY, W. R. N75-10108
N75-10109
EMYASHEV, A. V. N75-10463
ENVENT, F. N75-10467
EPIK, A. P. N75-10466
ERDMANN, F. N75-10110
ERICKSON, J. J. N75-10311
ERLICH, E. N75-10013
ESTES, R. H. N75-10851
EVANS, N. J., II N75-10885
EVANS, R. L. N75-10380
EVERETT, J. R. N75-10553
EWELL, G. W., III N75-10278

F

FAIRWEATHER, G. N75-10731
FAKUNDINY, R. H. N75-10536
FALCONE, A. S. N75-10069
FARRENKOPF, R. L. N75-10157
FARROW, J. E. N75-10305
FASANG, P. P. N75-10402
FASTIE, W. G. N75-10128
FEDDERN, U. N75-10324
FEDENKO, V. S. N75-10333
FEDERHOFER, J. A. N75-10288
FEDOROVSKIY, B. B. N75-10213
N75-10214
N75-10218
FEDOTOV, V. N75-10598
FEEN, M. M. N75-10747
FIMMEL, R. O. N75-10130
FINDLAY, J. A. N75-10621
FLAVIN, R. K. N75-10280
FOLEY, R. J. N75-10229
N75-10230
FONTAINE, G. N75-10870
FORBRICH, C. A., JR. N75-10184
FORRESTAL, M. J. N75-10499
FORRESTER, P. A. N75-10776
FORSTER, S. W. N75-10536
FOSTER, D. N. N75-10021
FOSTER, K. E. N75-10544
FOUGHNER, J. T., JR. N75-10007
FRANKEN, P. A. N75-10795
FRANTZEN, B. S. N75-10686
FRAYMAN, M. N75-10739
FREDEN, S. C. N75-10549
FREW, A. M. N75-10157
FRICK, J. K. N75-10057
FRIDMAN, G. K. N75-10433
FRIEDMAN, D. B. N75-10549
FRITSCHER, K. N75-10187
FROHMADER, K. P. N75-10319
FUBARA, D. M. J. N75-10671
FUJITA, . . N75-10752
FULLER, H. V. N75-10786
FURTH, H. P. N75-10804
N75-10805

G

GAALEMA, S. N75-10608
GAGLAY, V. M. N75-10214
GALDA, K. H. N75-10234
GARDNER, J. H. N75-10816
GARVIN, D. N75-10180
GARY, S. P. N75-10798
GATES, R. F. N75-10157
GAUBERT, G. N75-10370
GEE, S. N75-10852
GEGG, S. R. N75-10641
GEHLEN, P. C. N75-10241
N75-10243
N75-10244
GELLES, S. H. N75-10225
GENAW, L. N75-10083
GIAQUINTA, A. R. N75-10338
GIBBS, D. C. C. N75-10713
GIBBS, E. W. N75-10867
GIELEN, S. Y. N75-10699
GILL, W. L. N75-10135
GILLESPIE, L. K. N75-10268
GILLESPIE, V. G. N75-10126
GILLIES, J. N75-10461
GILMER, D. S. N75-10543
N75-10557
GINZBURG, Y. L. N75-10354
GLOWACKI, W. J. N75-10392
N75-10397
GOCHENOUR, D. L., JR. N75-10735
GOEDE, P. J. N75-10265
GOLDBERG, M. A. N75-10511
GOLDSTEIN, B. N75-10840
N75-10842
GOLDSTEIN, W. N75-10545
GOLL, J. H. N75-10751
GOODRUM, J. D. N75-10100
GORDIENKO, E. G. N75-10245
GORDON, H. H. N75-10566
GORDON, L. W. N75-10329
GORDON, P. N75-10236
GORODETSKII, A. F. N75-10836
GORWARA, A. E. N75-10045
GOTRA, Z. Y. N75-10307
GRABE, W. N75-10090
GRAEVSKII, A. N. N75-10454
GRANT, K. N75-10625
GRAY, N. C. N75-10105
GREEN, B. I. N75-10737
GREEN, L. G. N75-10260
GREENBAUM, A. N75-10485
GREENBERGER, A. N75-10802
GREENE, P. R. N75-10363
GRIESENAUER, N. M. N75-10225
GRIFFIN, R. E. N75-10575
GRINYUK, V. S. N75-10223
GROMAN, R. C. N75-10641
GRUBER, S. N75-10812
GRUNBAUM, B. W. N75-10690
GRUNDMANN, R. N75-10384
GUPTA, G. D. N75-10501
GUREVICH, M. A. N75-10197
GURSKI, T. R. N75-10791
GUTHRIE, M. P. N75-10592

H

HAASE, E. F. N75-10544
HABERMAN, D. R. N75-10154
HACKETT, J. E. N75-10005
HAFNER, P. N75-10808
HAFTKA, R. T. N75-10484
HAGAN, B. T., JR. N75-10073
HAGEDORN, H. N75-10321
HAHN, G. T. N75-10243
HAINES, D. A. N75-10629
HALFORD, G. R. N75-10489
HALL, G. E. N75-10476
N75-10477
HALL, G. S. N75-10689
HALL, R. J. N75-10447
HALPERN, D. N75-10676
HALTINER, G. J. N75-10664
HAMLEN, W. A. N75-10615
HAMMERSCHLAG, A. N75-10134
HAMSTAD, M. A. N75-10253
HANKINS, J. D. N75-10313
HAPPER, W. N75-10272
HARASHIMA, F. N75-10310
HARDY, E. N75-10526
HARKNESS, J. D. N75-10583
HARMAN, R. W. N75-10428
HARRINGTON, J. A. N75-10453
HARRISON, G. F. N75-10491
HARTL, P. N75-10146
HARTMAN, R. N75-10063
HARTMANN, S. R. N75-10272
HARTON, P. L. N75-10156
HARTWELL, T. D. N75-10618
HAUBER, J. R. N75-10229
HAVILL, C. D. N75-10004
HAWKINGS, D. L. N75-10756
HAWKINS, F. J. N75-10882
HAWRYLUK, R. N75-10803
HAYASHI, F. Y. N75-10479
HAYNE, G. S. N75-10143
HEAP, B. R. N75-10724
HENDRICKS, C. J. N75-10345
HENRY, D. G. N75-10335

HEPWORTH, M. T. N75-10247
HERBSLEB, G. N75-10211
HEWITT, H. J. N75-10297
HIBBEN, S. G. N75-10524
N75-10675
HIGER, A. L. N75-10540
HIGGINS, G. T. N75-10236
HILL, G. E. N75-10098
HILL, W. G., JR. N75-10363
HIMMELL, L. C. N75-10178
HINNOV, E. N75-10802
HINZPETER, U. N75-10292
HIRONDEL, D. N75-10620
HIRST, E. N75-10039
HIRTH, J. P. N75-10244
HISHAW, R. J. N75-10270
HIZA, M. J. N75-10844
HOAGLAND, R. G. N75-10244
N75-10256
HOF, G. J. N75-10317
HOFFER, R. M. N75-10531
HOFFMAN, A. R. N75-10678
HOFFMAN, D. J. N75-10080
HOFFMAN, G. H. N75-10362
HOFFMANN, L. N75-10318
HOFMANN, F. N75-10808
HOHENEMSER, K. H. N75-10003
HOHL, F. N75-10798
HOILMAN, K. N75-10608
HOLEMAN, B. R. N75-10777
HOLLAND, W. N75-10164
HOLLOWAY, P. H. N75-10228
N75-10316
HOLLWORTH, B. R. N75-10344
HOLMAN, J. L. N75-10267
HOLMES, R. F. N75-10366
HOLTON, W. C. N75-10445
HOLZACH, H. N75-10159
HONEYCUTT, L., III N75-10165
HOOTON, T. R. N75-10277
HOPPEN, W. G. N75-10269
HORN, R. T. N75-10437
HORNSTRA, G. N75-10699
HOUSTON, J. E. N75-10833
HOVESTADT, D. N75-10896
HOYLER, G. N75-10321
HSUAN, H. N75-10803
HUET, C. N75-10368
HUGHES, T. N75-10152
HUNT, P. N. N75-10618
HUNTER, G. H. N75-10754
HWANG, C. N75-10054
HYLER, W. S. N75-10506

I

IDELCHIK, I. Y. N75-10354
IGENBERGS, E. B. N75-10799
IKRATH, K. N75-10046
ILIC, D. N75-10797
INMAN, R. E. N75-10605
IOSIFOV, R. D. N75-10099
IRWIN, H. P. A. H. N75-10023
ISACHSEN, Y. W. N75-10536
ISKOE, J. L. N75-10255
ISOJIMA, Y. N75-10483
IVANOV, L. I. N75-10242
IVANOV, O. S. N75-10204
IVANOV, V. I. N75-10679
IWENS, R. P. N75-10157
IZOTOV, A. A. N75-10869

J

JACOBSON, I. D. N75-10400
N75-10708
JAEGER, D. N75-10235
JAKSCH, J. A. N75-10692
JAMET, J. N75-10015
JANOSKO, R. E. N75-10048
JANZON, B. N75-10415
JARMAN, J. W. N75-10554
JASSBY, D. L. N75-10805
JAWORSKI, W. N75-10678
JELINEK, F. J. N75-10230
JENDRZEJCZYK, J. A. N75-10349
JENNY, J. N75-10282
JESSOP, E. S. N75-10253
JEWETT, D. N. N75-10602
JEWETT, W. M. N75-10296
JHANSALE, H. R. N75-10507
JOHANEK, W. R. N75-10464
JOHANSSON, B. C. A. N75-10020
JOHN, H. N75-10053
JOHN, T. N75-10181
JOHNSON, C. B. N75-10008
JOHNSON, F. D. N75-10719
JOHNSON, H. H. N75-10231
JOHNSON, J. L. N75-10458
JOHNSON, L. N75-10569
JOHNSON, L. R. N75-10735
JOHNSON, T. N75-10805
JOHNSON, W. N75-10057
JONES, C. O. N75-10745
JONES, H. D. N75-10787
JONES, R. C. N75-10552
JOST, G. S. N75-10737
JOYCE, A. T. N75-10560

K

KACHEL, I. N75-10728
KAGAWA, R. N75-10196
KAHN, D. A. N75-10779
KAIBYSHEV, O. A. N75-10245
KALISZEWSKI, T. N75-10673
KALOS, M. H. N75-10182
KALT, A. N75-10111
KAMIMOTO, G. N75-10435
KAMMERMAIER, J. N75-10321
KANAREIKIN, D. N75-10303
KANG, C. E. N75-10827
KANNINEN, M. F. N75-10241
N75-10243
KAPADIA, C. M. N75-10251
KAPER, H. G. N75-10732
KATELL, S. N75-10579
KATZ, D. L. N75-10600
N75-10604
KATZBERG, S. J. N75-10785
KAWABATA, K. N75-10871
KAZAROFF, J. M. N75-10172
KEFALAS, G. P. N75-10312
KELKAR, A. H. N75-10251
KELLER, E. E. N75-10366
KELLER, M. N75-10532
KELLER, R. A. N75-10693
KELLEY, H. L. N75-10009
KELLY, F. J. N75-10624
KELLY, R. O. N75-10126
KEMMERER, A. J. N75-10555
KENNEL, C. F. N75-10889
KEOUGH, M. B. N75-10135
KERR, A. D. N75-10510
KEYES, C. G., JR. N75-10657
N75-10658
KHARITONOV, V. P. N75-10598
KHOROSHKO, I. N. N75-10220
KIDDLE, F. E. N75-10503
KILLEEN, J. N75-10805
KIRBY, C. A. N75-10407
KIRBY, D. A. N75-10030
KIRBY, D. K. N75-10157
KIRCHNER, H. P. N75-10092
N75-10258
KIRK, W. J. N75-10315
KIRK, W. J., JR. N75-10830
KIRSCH, K. J. N75-10357
KITAZAWA, J. N75-10483
KLEIN, A. N75-10352
KLEIN, M. J. N75-10192
KLETT, A. T. N75-10557
KNAPP, G. R. N75-10883
KNOTEK, M. L. N75-10834
KO, T. N75-10817
KODAMA, A. M. N75-10690
KOEHLER, B. R., JR. N75-10341
KOEHLER, R. N75-10103
KOERNER, W. N75-10374
KOGAN, Z. N. N75-10628
KOHLER, J. T. N75-10181
KOLE, R. N75-10102
KOLOKOLOV, V. P. N75-10623
KOLOSOV, I. A. N75-10705
KOLPAKOV, A. Y. N75-10395
KOLPISHON, E. Y. N75-10222
KONDRATENKO, R. N. N75-10308
KOONCE, J. M. N75-10112
N75-10115
KOPANEV, V. I. N75-10687
KOSYAN, V. V. N75-10222
KOVALEV, M. P. N75-10401
KOVNER, D. S. N75-10395
KOWAKA, M. N75-10207
KOZLITIN, D. A. N75-10220
KOZUBOVSKY, S. F. N75-10422
KOZYREV, B. P. N75-10325
KRAFT, H. P. N75-10728
KRAUS, W. N75-10788
KRAUSSE, J. N75-10319
KRAVCHENKO, A. F. N75-10836
KRAVETSKII, G. A. N75-10463
KREKOV, G. M. N75-10654
KREMPL, E. N75-10492
KROUTIL, J. C. N75-10361
N75-10362
KRYTER, K. D. N75-10093
KSIENSKI, A. A. N75-10293
N75-10304
KUDO, T. N75-10207
KUIPER, T. B. H. N75-10883
KUKIS, S. I. N75-10643
KULSRUD, R. M. N75-10805
KUO, B. C. N75-10875
KUROCHKIN, A. P. N75-10433
KURYLEV, V. V. N75-10198
KURZIUS, S. C. N75-10450
KUZNETSOV, V. A. N75-10796
KUZNETSOV, V. V. N75-10810

L

LADY, E. R. N75-10600
N75-10604
LAGRONE, A. H. N75-10113
LANDEN, T. N75-10019
LANDRAULT, C. N75-10158
LANGE, F. F. N75-10255
LANGLAND, R. T. N75-10720
LAPP, M. N75-10390
LARAMORE, G. E. N75-10833
LARSON, D. J., JR. N75-10119
N75-10226
LASHER, L. N75-10346
LASSITER, W. S. N75-10196
LATANISION, R. M. N75-10248
LAU, L. S. N75-10656
LAUER, J. L. N75-10455
LAVAL, P. N75-10369
LAVRENTEVA, M. A. N75-10514
LEAF, G. K. N75-10732
LEAVITT, R. P. N75-10848
LEE, K. N75-10530
LEE, S. S. N75-10572
LEEDHAM, H. C. N75-10867
LEGGE, H. N75-10379
N75-10386
LEHNERT, B. N75-10807
LEIPOLD, M. H. N75-10251
LEN, K. T. N75-10435
LENSKI, J. W., JR. N75-10097
LENTNER, M. N75-10657
N75-10658
LEPLEY, L. K. N75-10544
LESKOV, B. N. N75-10631
LEVESQUE, D. N75-10182
LEVIN, B. R. N75-10276
LEVY, M. E. N75-10311
LEWIS, J. W. L. N75-10399
LI, C. Y. N75-10515
LICHTFUSS, H. J. N75-10383
LIEVENS, C. N75-10055
LIN, Y. T. N75-10293
LINDEMAN, A. J. N75-10732
LINDGREN, D. T. N75-10545
LINDROTH, D. P. N75-10562
LINNANDER, R. J. N75-10190
LIPS, H. N75-10263
LISKOW, C. L. N75-10283
LITVINOVA, V. D. N75-10622
LIU, C. H. N75-10359
LIU, C. S. N75-10805
LIVEZEY, R. E. N75-10343
LO, D. L. C. N75-10482
LOBODIN, T. V. N75-10623
LOEBERT, G. N75-10059
LOMBARD, C. K. N75-10893
LONG, R. F. N75-10634
N75-10636
LONG, R. L., JR. N75-10316
LORENTZEN, F. V. N75-10706
LORENZINI, D. A. N75-10424
LORENZO, C. F. N75-10171
LOTENS, W. A. N75-10044
LOTTI, F. N75-10717
LOVILL, J. E. N75-10638
LOWE, D. S. N75-10784
LOWERY, R. R. N75-10208
LOWSON, M. V. N75-10756
LUDTKE, P. R. N75-10403
LUKAS, J. S. N75-10893
LUMSDEN, R. B. N75-10043
LUNDSTROM, R. R. N75-10147
LUNSFORD, J. V. N75-10657
N75-10658
LUSHCHIK, V. G. N75-10395
LYNER, A. G. N75-10275
LYNN, J. W. N75-10205
LYTTLE, J. D. N75-10281
N75-10282
N75-10287

M

MACARTHUR, J. L. N75-10425
MACCO, J. G. N75-10509
MACDONALD, R. B. N75-10558
MACEK, A. N75-10265
MACKLEY, E. A. N75-10348
MADISON, M. W. N75-10736
MADSEN, B. N75-10616
MAEHL, R. C. N75-10897
MAGAZENKOV, L. N. N75-10662
MAGDE, D. N75-10199
MAHDAVI, M. R. N75-10174
MAKARUCHA, L. J. N75-10753
MAKIN, B. N75-10174
MALILA, W. A. N75-10527
MALONEY, P. N75-10069
MALTSEV, V. M. N75-10198

MALYI, V. I. N75-10505
MALYKHIN, A. I. N75-10606
MANADALIEV, N. A. N75-10393
MANAKOV, K. N. N75-10519
MANI, R. N75-10094
MANN, R. J. N75-10157
MANNING, C. R., JR. N75-10165
MANNING, J. R. N75-10457
MANSON, S. S. N75-10489
MARCHERTAS, A. H. N75-10486
MARCHETTI, M. N75-10372
MARCUM, D. C., JR. N75-10008
MARGUET, R. N75-10368
MARINCIC, N. N75-10612
MARINSKIY, G. S. N75-10213
N75-10214
MARKIN, E. P. N75-10454
MARKWORTH, A. J. N75-10241
MARROQUIN, J. N75-10148
N75-10170
MARSCHALL, C. W. N75-10256
MARSH, J. G. N75-10413
N75-10567
MARSHALL, L. M., JR. N75-10049
N75-10050
N75-10051
MARSTON, C. H. N75-10443
MARTIN, J. H. N75-10582
MASCHOFF, L. W. N75-10418
MASON, K. O. N75-10882
MASUDA, Y. N75-10194
MASUNG, L. S. N75-10899
MATLIN, G. N75-10458
MATSUI, H. N75-10435
MATTES, H. N75-10292
MATTES, R. E. N75-10065
MATTHEWS, K. N75-10882
MATVIYKIV, M. D. N75-10307
MAUGHAN, P. M. N75-10555
MAUL, G. A. N75-10529
MAZESS, R. B. N75-10695
N75-10696
MAZUMDER, M. K. N75-10357
MCANALLY, W. J., III N75-10100
MCANELLY, W. B. N75-10122
MCDANAL, A. J. N75-10449
N75-10450
MCDONALD, F. B. N75-10899
MCDOUGAL, A. R. N75-10456
MCEVILY, A. J. N75-10493
MCGINNIES, W. G. N75-10544
MCGLINCHEY, L. F. N75-10169
MCGRATH, R. T. N75-10800
MCIVOR, R. A. N75-10725
MCLAUGHLIN, M. D. N75-10038
MEADE, D. M. N75-10803
N75-10804
MEDOVAR, B. I. N75-10213
N75-10215
N75-10216
N75-10217
N75-10218
N75-10219
N75-10220
N75-10222
MEERT, A. N75-10809
MEHRABIAN, M. R. N75-10225
MEIER, M. F. N75-10539
MEISEL, D. D. N75-10876
MELZNER, F. N75-10320
MENNELL, R. N75-10152
MERCANTI, E. P. N75-10549
MERONEY, R. N. N75-10377
N75-10398
MESERVEY, E. N75-10802
MESKAN, D. A. N75-10436
MESSINA, R. J. N75-10872
METCALFE, A. G. N75-10192
METZNER, G. N75-10320
MEYER, J. R. N75-10881
MICKUS, J. N75-10616
MIDDLEBROOK, R. D. N75-10150
MIDDLETON, D. B. N75-10061
MIKATARIAN, R. R. N75-10450
N75-10451
MIKHAILOVA, G. K. N75-10514
MILES, R. F., JR. N75-10142
MILLARD, G. H. N75-10274
MILLER, J. F. N75-10225
MILLER, J. M. N75-10551
MILLS N75-10866
MINCHIN, S. N. N75-10886
MINFORD, W. J. N75-10246
MINTER, E. J. N75-10459
MITRYAEV, I. M. N75-10078
MLAVSKY, A. I. N75-10602
MOAK, D. P. N75-10225
N75-10229
MOELLER, F. N75-10659
MOELLER, G. F. N75-10880
MOEN, A. L. N75-10196
MOHAUPT, J. N75-10318
MOJOLA, O. O. N75-10375
MOLLIE, P. N75-10782
MONROE, R. E. N75-10118
MONTROLL, E. W. N75-10835
MOOKHERJI, T. K.
MOORE, D. T.
MOORE, R. A.
MOORE, R. C.
MORGAN, I. T.
MORLEY, L. W.
MORRIS, J. B.
MORZHAKOV, S. P.
MOSES, H. L.
MOSS, G.
MOSS, T. A.
MOURAD, A. G.
MUEGGE, R.
MUETHING, G. F.
MULKIDZHANOV, I. K.
MURARKA, R. S.
MURLIS, J.
MURPHY, C. G.
MUSICK, H. B.
MUSKHELISHVILI, N. I.
MUTSCHLER, P. H.
MYERS, D. L.

N

NAIR, P.
NALEPKA, R. F.
NANEY, R. L.
NAUMANN, R. J.
NEKHOTYAEV, V. V.
NEROBEEV, T. D.
NEUGEBAUER, G.
NEWBOLD, P.
NEWELL, J. D.
NEWMAN, B. E.
NG, E. W.
NIDICK, E. J., JR.
NIETUBICZ, C. J.
NIMMO, B.
NIX, W. D.
NIXON, D.
NOR, J. K.
NORMAN, R. M.
NOVAK, B.
NUGENT, P. R.

O

OBEDIYENTOVA, G. V.
OBER, R. F.
OBRIEN, J. F., JR.
OBRIEN, J. J.
OBRIEN, J. T.
OCONNOR, J. M.
OGREN, H.
OKABAYASHI, M.
OKE, J. B.
OKEEFE, J. D.
OLLERHEAD, J. B.
ONG, R. S. B.
ONUOHA, D.
OPPERHAUSER, H., JR.
ORI, C.
ORMISTON, R. A.
ORMSBEE, A. I.
OUTLAW, D. G.
OVSYANKIN, V. V.
OZEROV, E. S.

P

PACE, N.
PACKMAN, D.
PADULA, S. L.
PALASTIN, L. M.
PALLADINO, V.
PANCRATOV, A. V.
PARK, R. L.
PARKER, D. E.
PARKER, F. W.
PARRISH, W. R.
PASQUINI, G.
PASS, D. S.
PATIL, P. G.
PATON, B. Y.
PATRICK, D. P.
PAUCKERT, R. P.
PAVLOV, V. L.
PAYNE, W. F.
PEARSON, M. J.
PEELER, D. J.
PENG, D. P.
PENNEY, C. M.
N75-10122 PENNEY, M. E. N75-10566
N75-10770 PENROD, J. R. N75-10326
N75-10496 PEPELKO, W. E. N75-10711
N75-10049 PERLOWSKI, A. J. N75-10719
N75-10050 PERSCHY, J. A. N75-10718
N75-10051 PETERS, H. J. N75-10040
N75-10407 PETRERA, S. N75-10767
N75-10550 PETROVSKII, V. S. N75-10096
N75-10726 PETTYJOHN, W. A. N75-10556
N75-10401 PETZEL, G. N75-10553
N75-10396 PFEIFER, H. J. N75-10441
N75-10702 PFEIFER, W. H. N75-10229
N75-10458 PHILLIPS, E. N75-10526
N75-10671 PHIPPS, G. S. N75-10416
N75-10659 PI, W. S. N75-10054
N75-10719 PIAN, C. C. P. N75-10758
N75-10036 PICHOIR, F. N75-10014
N75-10577 PICKERING, S. M. N75-10552
N75-10376 PIERALLI, F. N75-10717
N75-10813 PIFKO, A. B. N75-10511
N75-10544 PINCKNEY, S. Z. N75-10412
N75-10514 PIRADOV, A. S. N75-10865
N75-10614 PISACANE, V. L. N75-10747
N75-10074 PLUHOWSKI, E. J. N75-10541
PLYUTTO, A. A. N75-10811
PODPLASKIN, B. G. N75-10789
POISSON-QUINTON, P. N75-10055
POLAK, A. F. N75-10113
N75-10504 POLCYN, F. C. N75-10564
N75-10527 POLLACK, R. I. N75-10613
N75-10438 POPKOV, A. I. N75-10654
N75-10414 PORKOLAB, M. N75-10801
N75-10512 POTAPOVA, L. A. N75-10056
N75-10631 POTTER, J. L. N75-10340
N75-10882 POWELL, H. M. N75-10399
N75-10101 POWERS, J. E. N75-10600
N75-10693 N75-10604
N75-10439 PRANGE, R. E. N75-10839
N75-10730 PRAYTOR, E. B. N75-10005
N75-10260 PRIBYL, R. E. N75-10079
N75-10116 PRICE, C. F. N75-10162
N75-10616 PRICE, D. C. N75-10690
N75-10498 PRICE, I. N75-10849
N75-10027 PRICE, L. L. N75-10399
N75-10149 PROTSENKO, A. M. N75-10513
N75-10456 PROVOST, W. N75-10500
N75-10521 PUDRIKOV, E. V. N75-10306
N75-10719 PULLARA, J. C. N75-10312
PULS, J. N75-10159

Q

N75-10517
N75-10206 QUINN, T. J. N75-10066
N75-10745 N75-10067
N75-10682
N75-10683

R

N75-10442
N75-10845
N75-10083 RAEDER, J. N75-10365
N75-10803 RAGHURAMAN, P. N75-10379
N75-10879 RAHN, F. H. N75-10577
N75-10431 RAINHART, L. G. N75-10189
N75-10755 RAKHMATULIN, K. A. N75-10393
N75-10758 RAMSEY, P. E. N75-10151
N75-10577 RAMSEY, W. N75-10594
N75-10248 RANDALL, B. A. N75-10888
N75-10717 RAO, C. N. R. N75-10193
N75-10003 RAPER, J. L. N75-10147
N75-10058 RATLIFF, A. W. N75-10449
N75-10086 N75-10452
N75-10114 RATWANI, M. N75-10501
N75-10183 RAZSOLOV, N. N75-10685
N75-10197 REED, D. H. N75-10091
REED, J. H. N75-10035
REED, L. E. N75-10556
REED, R. K. N75-10676
REHDER, J. B. N75-10537
N75-10690 REIFSNIDER, K. L. N75-10504
N75-10882 REIGBER, C. N75-10132
N75-10359 REINEL, K. N75-10159
N75-10328 REINER, R. J. N75-10446
N75-10828 REINKENHOF, J. N75-10173
N75-10454 REINKER, R. P. N75-10339
N75-10833 RICHARD, N. N75-10225
N75-10635 RICHARDS, D. A. N75-10641
N75-10136 RILEY, J. L. N75-10274
N75-10844 RINDERLE, H. N75-10322
N75-10717 RING, L. R. N75-10451
N75-10660 RIPPEY, J. O. N75-10135
N75-10481 RIZZI, A. R. N75-10125
N75-10212 ROBERTS, J., JR. N75-10065
N75-10215 ROBERTSON, M. K. N75-10151
N75-10216 RODERICK, N. F. N75-10814
N75-10217 RODEWALD, M. N75-10031
N75-10218 RODIONOV, N. G. N75-10099
N75-10224 ROGERS, R. H. N75-10556
N75-10302 ROHWEIN, G. J. N75-10417
N75-10167 ROLAND, H. E., JR. N75-10033
N75-10219 ROLFES, R. W. N75-10240
N75-10176 ROMANO, G. N75-10766
N75-10145 N75-10767
N75-10093 ROMANOWSKI, R. F. N75-10104
N75-10824 ROMUSHKEVICH, V. I. N75-10669
N75-10390 ROOT, G. S. N75-10229

ROSE, L. N75-10155
ROSENBLUTH, M. N. N75-10805
ROTTA, J. C. N75-10353
ROWE, I. N75-10458
ROWELL, E. E., III N75-10396
ROWELL, E. M. N75-10524
ROZENENKOVA, V. A. N75-10465
ROZHDESTVENEKII, B. G. N75-10642
RUBIN, B. N75-10594
RUBIN, J. N75-10127
RUCK, G. T. N75-10673
RUDENKO, V. N. N75-10796
RUDRAPATNA, A. N. N75-10708
RUFF, P. E. N75-10506
RUML, D. J. N75-10545
RUSSELL, J. W. N75-10348
RUTHERFORD, P. H. N75-10804
N75-10805
RYABCHENKOV, A. V. N75-10183
RYAN, N. E. N75-10227
RYBIN, I. V. N75-10606

S

SAAD, A. N75-10769
SACHENKOV, A. V. N75-10512
SADOULET, B. N75-10828
SAJBEN, M. N75-10361
N75-10362
SAKURAI, K. N75-10285
SALOMONSON, V. V. N75-10559
SAMOILOV, E. M. N75-10836
SAMSOMOV, G. V. N75-10466
SAMSON, C. A. N75-10305
SANFORD, P. W. N75-10882
SAPOZHNIKOVA, S. A. N75-10668
SAUTHOFF, N. N75-10803
SAWYER, R. H. N75-10038
SCHAEFER, S. C. N75-10846
SCHAFFNER, M. R. N75-10715
SCHEFFEE, R. S. N75-10265
SCHENZ, A. F. N75-10825
SCHMIDT, J. N75-10803
SCHMIDT, J. L. N75-10431
SCHNEIDER, K. S. N75-10298
SCHNITZLER, A. N75-10321
SCHOENFELD, A. D. N75-10150
SCHREIBER, R. N75-10823
SCHULZ-JANDER, B. N75-10385
SCHUPLER, B. N75-10882
SCHWARTZ, P. N75-10764
SCHWARTZ, R. J. N75-10608
SCHWARZSCHILD, M. N75-10879
SCHWEIGER, G. N75-10440
SCOTT, I. G. N75-10753
SCUDERI, J. A. N75-10666
N75-10667
SEDOVA, L. I. N75-10514
SEDRICK, A. V. N75-10361
SEDRICR, A. V. N75-10362
SEEBACHER, G. N75-10321
SEIDL, F. G. P. N75-10804
SEKANINA, Z. N75-10891
SELLE, J. E. N75-10591
SEPUCHA, R. C. N75-10200
SEVRUK, A. N. N75-10222
SHAKINA, N. P. N75-10628
SHAMIR, J. N75-10728
SHAPIRO, S. L. N75-10439
SHAVRIN, A. I. N75-10222
SHCHERBAKOV, Y. A. N75-10427
SHEIVES, T. C. N75-10563
SHELSWELL, P. N75-10275
SHEVELEVA, T. Y. N75-10325
SHIELDS, E. W. N75-10147
SHIMAMURA, K. N75-10194
SHIN, Y. W. N75-10350
SHIRLEY, J. A. N75-10447
SHNEEROV, B. E. N75-10662
SHNEYBERG, V. M. N75-10223
SHORT, N. M. N75-10561
SHRIVER, E. L. N75-10799
SHVETS, M. E. N75-10662
SIEVERS, A. J. N75-10832
SIMMONDS, A. L. N75-10348
SIMPER, J. I. N75-10026
SIMPSON, R. B. N75-10545
SIMSON, R. N75-10321
SINGH, G. N75-10875
SINNETT, J. M. N75-10064
SINNIS, J. N75-10803
SIVERS, A. P. N75-10299
SKALEY, J. N75-10526
SKIFSTAD, J. G. N75-10444
N75-10448
SLOCUM, G. K. N75-10778
SMIRNOV, N. N. N75-10036
SMITH, B. T. N75-10832
SMITH, D. L. N75-10837
SMITH, D. M. N75-10771
SMITH, E. M. N75-10490
SMITH, H. D. N75-10449
SMITH, J. B., JR. N75-10762
SMITH, P. D. N75-10024
SMITH, R. A. N75-10759
SMITH, S. D. N75-10452
SNOW, P. B. N75-10331
SOARD, T. N75-10153
SOBOLEV, G. A. N75-10433
SOBOLEV, Y. V. N75-10222
N75-10082
SOLAK, J. B. N75-10465
SOLNTSEV, S. S. N75-10432
SOMERS, J. W. N75-10610
SONJU, O. K. N75-10083
SOTANSKI, D. N75-10258
SOTTER, W. A. N75-10891
SOUTHWORTH, R. B. N75-10672
SPAR, J. N75-10157
SPENCER, D. J. N75-10319
SPENKE, E. N75-10125
SPREITER, J. R. N75-10203
SQUIRES, R. G. N75-10741
SRIDHAR, B. N75-10882
STARK, A. N75-10010
STARK, V. J. E. N75-10484
STARNES, J. H., JR. N75-10790
STEARNS, C. R. N75-10188
STEELE, J. W. N75-10738
STEIN, W. N75-10577
STEINBERG, H. A. N75-10104
STEINBERG, I. H. N75-10472
STENBERG, E. N75-10478
STEPHENSON, J. B. N75-10267
STERENBOGEN, Y. A. N75-10220
STEVENSON, W. H. N75-10555
STEWARD, W. G. N75-10266
STIRNER, H. N75-10728
STISO, S. N. N75-10250
STITTSWORTH, D. E. N75-10460
STODIEK, W. N75-10802
STOEVENER, H. H. N75-10692
STOFFEL, S. W. N75-10106
STOFFERS, G. N75-10420
STOUT, I. J. N75-10616
STOVER, F. D. N75-10657
N75-10658
STRADOMSKII, Y. I. N75-10334
STRASBURG, A. C. N75-10261
STRELKOVA, L. P. N75-10743
STRINGER, F. S. N75-10775
STUBICAN, V. S. N75-10246
STUPAK, L. M. N75-10218
SU, F. Y. N75-10436
SUBBARAO, G. V. N75-10193
SUIT, W. T. N75-10006
SULADZE, K. S. N75-10811
SULLIVAN N75-10858
SUREK, T. N75-10602
SUSHIN, V. N. N75-10463
SUZUKI, H. N75-10483
SWARTZ, J. C. N75-10602
SWEET, J. N. N75-10471
SWIERKOWSKI, S. P. N75-10831
SWINDELL, W. N75-10130
SWITENDICK, A. C. N75-10233
SZUCH, J. R. N75-10095

T

TABAKOFF, W. N75-10087
TALALOV, I. I. N75-10334
TALBOT, L. N75-10815
TAMIR, T. N75-10793
TATE, E. N75-10443
TATE, T. N. N75-10764
TAYLOR, D. M. N75-10678
N75-10712
TAYLOR, J. H. N75-10162
TEK, M. R. N75-10600
N75-10604
TENNEY, F. H. N75-10805
TENO, J. N75-10610
TEREKHOVA, K. S. N75-10401
TERRELL, B. H. N75-10329
THEONES, J. N75-10449
N75-10450
N75-10452
THIERY, J. N75-10488
THIRUVENGADAM, A. N75-10467
THOMANN, H. N75-10318
THOMAS, M. W. N75-10089
THOMPSON, D. H. N75-10350
TIEDEMAN, L. N75-10608
TIKHONOVSKIY, A. L. N75-10224
TINGEY, D. L. N75-10535
TOBIN, R. D. N75-10167
TOLSTYKH, A. I. N75-10355
TOPUNOV, A. M. N75-10099
TREINIES, N. N75-10018
TROST, J. N75-10446
TRULIO, J. G. N75-10178
TSOU, H. S. N75-10157
TSUKANOV, G. E. N75-10215
TSVETKOV, N. A. N75-10223
TSVYASHCHENKO, N. A. N75-10220
TUCKER, W. K. N75-10499
TULPULE, A. H. N75-10868
TUMANOV, A. T. N75-10465
TYLER, R. A. N75-10107
TYUNIN, N. N. N75-10077

U

ULABY, F. T. N75-10411
ULANOWICZ, R. E. N75-10571
ULLMAN N75-10857
ULUBEKOV, A. T. N75-10886
UMANSKIY, S. P. N75-10688
US, V. I. N75-10213
N75-10214
N75-10218
USHAKOV, M. V. N75-10077
USPENSKII, A. N. N75-10430
UTFSHEV, S. A. N75-10505
UYEHARA, M. N75-10312

V

VALIDOV, M. A. N75-10744
VANDERVOORT, A. W. M. N75-10421
VANDOKKUM, W. N75-10680
VANDYKE, D. P. N75-10417
VANHOLLEBEKE, M. A. I. N75-10899
VANVOORSTVADER, F. N75-10254
VAZHENINA, Z. P. N75-10306
VERBEEK, W. J. P. A. N75-10573
VERESHCHAGIN, I. N75-10822
VERESHCHAGIN, V. G. N75-10744
VERLET, L. N75-10182
VERMEULEN, H. N75-10587
VERSTRAETEN, P. N75-10500
VEZIROGLU, T. N. N75-10572
VICKERS, D. N75-10616
VLADIMIROVA, O. N. N75-10433
VONGOELER, S. N75-10802
VONHAKE, C. A. N75-10520
VONPRAGENAU, G. L. N75-10407
VONRIESEMANN, W. A. N75-10499
VOROSHILOV, V. I. N75-10884
VOSS, F. N75-10319
VOTH, R. O. N75-10266

W

WADDELL, M. L. N75-10830
WAGNER, C. E. N75-10816
WAGNER, T. W. N75-10564
WAILLY, L. F. N75-10704
WALKDEN, F. N75-10381
WALKER, F. E. N75-10260
WALLS, D. M. N75-10413
N75-10567
WALRAVEN, J. N75-10044
WALSH, D. W. N75-10279
WALTER, H. G. N75-10419
WALTON, A. J. N75-10461
WAMBSGANSS, M. W. N75-10349
WANG, J. S. N75-10843
WANG, S. N75-10838
WANIEK, R. W. N75-10609
WANNER, J. C. N75-10060
WARFORD, H. S. N75-10714
WASSERMAN, L. H. N75-10722
WATERMAN, A. N75-10335
WATTERS, J. W. N75-10704
WATTS, R. K. N75-10445
WEBB, W. R. N75-10300
WEBER, E. N75-10387
WEDDIGE, D. N75-10697
WEHNELT, U. N75-10321
WEILER, H. N75-10262
N75-10263
WEISS, A. H. N75-10181
WELLMAN, P. N75-10579
WELLS, C. H. N75-10494
WELLS, M. B. N75-10726
WELLS, W. G. N75-10764
WENDE, C. D. N75-10410
WERLE, H. N75-10012
WERTH, G. N75-10594
WESELY, M. L. N75-10790
WESTBROOK, C. K. N75-10874
WHALEN, J. J. N75-10297
WHETSTONE, W. D. N75-10495
N75-10496
WHITE, B. P. N75-10081
WHITE, M. H. N75-10300
WICHNER, R. N75-10831
WIEDEMAN, D. H. N75-10468
WIERINGA, J. N75-10640
WILHELM, K. N75-10103
WILLIAMS, B. R. N75-10021
WILLIAMS, C. S. N75-10290
WILLIAMS, D. N. N75-10239
WILLIAMS, J. F. N75-10468
WILLIAMS, J. L. N75-10006
WILLIAMS, R. T. N75-10664
WILLIAMS, W. D. N75-10399
WILLIAMSON, R. G. N75-10107

WILSON, C. R. N75-10695
N75-10696
WILSON, G. J. N75-10082
WIMBERLY, E. T. N75-10540
WINDSOR, M. W. N75-10199
WINKLER, G. W. N75-10151
WINSOR, N. K. N75-10816
WINTER, S. N75-10594
WINTER, S. D. N75-10593
WINZER, G. N75-10728
WIRTH, G. N75-10187
WOGSLAND, N. C. N75-10084
WOLLAN, D. S. N75-10765
WOLOWICZ, C. H. N75-10062
WOODWARD, D. S. N75-10723
WOODWARD, F. A. N75-10358
WOODWORTH, B. M. N75-10681
N75-10682
N75-10683
WORK, E. W., JR. N75-10557
WRIGHT, D. J.
WYNN-WILLIAMS, C. G.
WYNNE, M. W.

Y

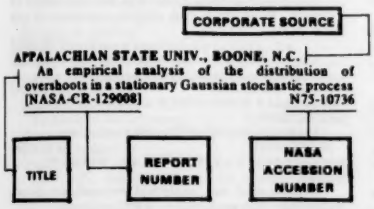
YABE, N. N.
YAMAMOTO, N.
YANCEY, R. B.
YEGNANARAYAN, K.
YEGORSHEVA, N. I.
YEMELYANENKO, Y. G.
YEN, C. L.
YENNI, K. R.
YOST, M. C.
YU, Y. N75-10681
N75-10682
N75-10683
YUSFIN, A. I. N75-10882
N75-10424

Z

ZABOLOTSKII, A. A. N75-10237
ZANKL, G. N75-10365
ZAREMBA, J. G. N75-10157
ZAUDERER, B. N75-10720
ZAUMEN, W. T. N75-10443
ZELKIN, E. G. N75-10892
ZIMMERMANN, K. J. N75-10330
ZIPFEL, P. H. N75-10160
ZLOBINSKII, B. M. N75-10070
ZOTEV, Y. A. N75-10198
ZUBAREV, D. N. N75-10183
ZUCKERMAN, B. N75-10847
ZUEV, V. E. N75-10885
ZUKOVICH, P. P. N75-10654
N75-10265

CORPORATE SOURCE INDEX

TYPICAL CORPORATE SOURCE INDEX LISTING



Listings in this index are arranged alphabetically by corporate source. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The NASA accession number denotes the number by which the citation is identified. The titles are arranged under each corporate source in ascending accession number order.

A

ACADEMY OF SCIENCES [USSR], MOSCOW.
Structure and properties of alloys for atomic energy
N75-10204

ADVANCED KINETICS, INC., COSTA MESA, CALIF.
Chemical to electromagnetic energy conversion techniques
[AD-783901] N75-10609

ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT, PARIS [FRANCE].
Hingeless rotorcraft flight dynamics
[AGARD-AG-197] N75-10003
Critical review of methods to predict the buffet capability of aircraft
[AGARD-R-623] N75-10053
Transonic buffet behavior of Northrop F-5A aircraft
[NASA-CR-140939] N75-10054
Low cycle high temperature fatigue
[AGARD-CP-155] N75-10487
Cold: Physiology, protection and survival
[AGARD-AG-194] N75-10706
Glossary of documentation terms. Part 2: Computer-user terms
[AGARD-AG-182-PT-2] N75-10713
Opto-electronics
[AGARD-LS-71] N75-10774

AEG-TELEFUNKEN, HEILBRONN [WEST GERMANY].
Technology of integration of junction field effect transistors
[BMFT-FB-T-74-11] N75-10322

AERODYNE RESEARCH, INC., BURLINGTON, MASS.
N2 scattering measurements at 10.6 microns
[AD-784723] N75-10200

AEROJET LIQUID ROCKET CO., SACRAMENTO, CALIF.
Integrated thruster assembly program
[NASA-CR-134509] N75-10163

AEROJET SOLID PROPULSION CO., SACRAMENTO, CALIF.
Asymmetric grain evaluation computer program
[AD-784350] N75-10264

AERONAUTICAL RESEARCH INST. OF SWEDEN, STOCKHOLM.
Measurements of dynamic stability derivatives of an ogive delta wing model at transonic and supersonic speeds
[FFA-TN-AU-925] N75-10019
Evaluation of the accuracy of two helicopter rotor theories
[FFA-124] N75-10020

AERONAUTICAL RESEARCH LABS., MELBOURNE [AUSTRALIA].
Relationship between microstructure and fracture toughness in D6ac steel
[ARL/MET-NOTE-103] N75-10227
Optimal confidence intervals for the standard deviation of a normal distribution
[ARL/SM-NOTE-406] N75-10737
Sound field intensities in liquids and solids
[ARL/MET-NOTE-100] N75-10753

AEROSPACE MEDICAL DIV. AEROSPACE MEDICAL RESEARCH LABS. [6570TH], WRIGHT-PATTERSON AFB, OHIO.
Acoustic scattering from a sphere with nonuniform surface impedance
[AD-783805] N75-10757

AEROSPACE MEDICAL RESEARCH LABS., WRIGHT-PATTERSON AFB, OHIO.
Measurement, evaluation, prediction and improvement of aircraft ride
[AD-783803] N75-10709

AIR FORCE ACADEMY, COLO.
A practical on-line filter to process gyrocompass data
[AD-783250] N75-10048
Experimental measurement of internal characteristics of spectral lines using the Roschdestvenskii hook method
[AD-783614] N75-10184
A root locus analysis of a seismic isolation control system
[AD-783615] N75-10424
Foil activation analysis and thermoluminescent dosimetry on Skylab 2
[AD-783779] N75-10704
Linear parametric instabilities at high pump powers
[AD-783780] N75-10814

AIR FORCE ARMAMENT LAB., EGLIN AFB, FLA.
Aerodynamic symmetry of aircraft and guided missiles
[AD-784254] N75-10070

AIR FORCE ROCKET PROPULSION LAB., EDWARDS AFB, CALIF.
Pyrolytic graphite coated throat inserts
[AD-783849] N75-10176

AIR FORCE SYSTEMS COMMAND, WRIGHT-PATTERSON AFB, OHIO.
A study of the damping characteristics on models of supersonic air lines at supersonic speeds
[AD-784259] N75-10077
Determination of the forces in the retractor of a three-dimensional landing gear mechanism
[AD-784257] N75-10078
Statement of the two-dimensional nonstationary problem of thermal conductivity for a bladed wheel of a gas turbine
[AD-784709] N75-10096
Solutions to the direct problem of heat transfer between a cooled turbine blade and gas using the dispersion method
[AD-783927] N75-10099
Laser rocket engines
[AD-784016] N75-10177
Heat resistant coatings obtained by chemical deposition from solutions
[AD-783981] N75-10183
The ignition limit of a conglomerate of metal particles
[AD-782073] N75-10197
Study of preignition processes in zirconium, titanium, and zirconium hydride
[AD-783965] N75-10198
Crystals and radiation: New horizons in the search for scientific knowledge
[AD-784721] N75-10201
Radio-electronics and space
[AD-783968] N75-10299
Determination of the energy of pulse current by a thermo-electric converter
[AD-783561] N75-10325
Calculating synchronous inductive reactances of contactless machines when magnetic circuit is saturated and of machines with superconducting excitation windings
[AD-784696] N75-10328
Causes for the occurrence of pulsed interference in remote-control connection circuits
[AD-783917] N75-10333
Harmonic components, of the magnetic conductivity of the air gap of electric motors on a gear surface
[AD-783930] N75-10334
Flow of a two phase medium with solid particles around a thin profile
[AD-783571] N75-10393
The influence of magnetic field on turbulent flow with a shift
[AD-784702] N75-10395
Autocorrelation and spectral methods of measuring speed of motion
[AD-783973] N75-10422
A method for determining the error of a laser gyroscope when measuring the turning angle of a moving base
[AD-783970] N75-10427
Lasers in chemistry
[AD-783049] N75-10454
High-temperature coatings on graphite
[AD-783567] N75-10463
Coatings for protecting metals under high-temperature heating and deformation
[AD-783566] N75-10465
Protective coatings from refractory compounds on metals and graphite
[AD-783923] N75-10466
Loss of stability of a cylindrical shell on longitudinal impact
[AD-783570] N75-10505
Methods of finite elements in analyses of continuous and combined constructions
[AD-783969] N75-10508
Large deflections of thin elastic plates
[AD-783047] N75-10512
Development of solar engineering in the USSR
[AD-784708] N75-10597
Characteristics of frontal cloud layers suitable for influence
[AD-783977] N75-10631
Automation of the hydrometeorological service
[AD-782822] N75-10642
Integration of equations of the dynamics of the atmosphere for solving problems in climate theory
[AD-783971] N75-10662
Study on properties of nonisothermal ion accelerator
[AD-782052] N75-10810
Acceleration of ions in heavy-current electron beams
[AD-782085] N75-10811

AIRCRAFT RESEARCH ASSOCIATION, LTD., BEDFORD [ENGLAND].
Results of a series of wind tunnel tests on the victor B.MK.2 aircraft and a comparison with drag estimates and full scale flight data
[ARC-CP-1283] N75-10026

AIRESEARCH MFG. CO., LOS ANGELES, CALIF.
Environmental control system transducer development study
[NASA-CR-140312] N75-10409

ALABAMA UNIV., HUNTSVILLE.
Low loss window materials for chemical lasers
[AD-784326] N75-10453

ALASKA UNIV., FAIRBANKS.
Environmental surveys in Alaska based upon ERTS data
N75-10551

AMERICAN UNIV., WASHINGTON, D.C.
Skylab-EREP investigations of wetlands ecology
[E74-10816] N75-10542

ANALYTIC SCIENCES CORP., READING, MASS.
Direct statistical analysis of missile guidance systems via cadet [covariance analysis describing function technique]
[AD-783098] N75-10162

APPALACHIAN STATE UNIV., BOONE, N.C.
An empirical analysis of the distribution of overshoots in a stationary Gaussian stochastic process
[NASA-CR-129008] N75-10736

APPLIED PHYSICS LAB., JOHNS HOPKINS UNIV., SILVER SPRING, MD.
An azimuth determination system using the Navy navigation satellites
[AD-784375] N75-10047
C-LAD: A low cost LORAN-C assist device. Volume I: Hardware
[AD-784312] N75-10049

C-LAD: A low cost LORAN-C assist device. Volume 2: Software
[AD-784313] N75-10050
C-LAD: A low cost LORAN-C assist device. Volume 3: Operating procedure
[AD-784314] N75-10051
A radar altimeter for satellite application
[AD-784373] N75-10425
Atmospheric measurements program
[AD-784374] N75-10653
Triad computer
[AD-784372] N75-10718
Propagation effects at radio frequencies on satellite navigation systems
[AD-784378] N75-10747

APPLIED SCIENCE ASSOCIATES, INC., APEX, N.C.
Engineering studies related to the Skylab program
[NASA-CR-137473] N75-10143

APPLIED THEORY, INC., LOS ANGELES, CALIF.
Numerical solution of the Navier-Stokes equations for rocket plumes at 120 km altitude
[AD-784332] N75-10178

ARGONNE NATIONAL LAB., ILL.
Added mass and damping of a vibrating rod in confined viscous fluids
[ANL-CT-75-08] N75-10349
NAHAMMER: A computer program for analysis of one-dimensional pressure pulse propagation in a closed fluid system
[ANL-8059] N75-10350
Nonlinear finite-element formulation for transient analysis of three-dimensional thin structures
[ANL-8104] N75-10486
Empirical investigation of reordering and data management for finite element systems of equations
[ANL-8056] N75-10732

ARINC RESEARCH CORP., ANNAPOLIS, MD.
Interservice utility helicopter reliability and maintainability comparative analysis
[AD-784177] N75-10080

ARIZONA STATE UNIV., TEMPE.
Conversion of a D17B [Minuteman 1] guidance computer to acquire and process evoked response information
N75-10714
The two dimensional transient solution of the carrier transport equations in solid-state devices
N75-10819

ARIZONA UNIV., TUCSON.
Multipath compensation of a DQPSK communication link
N75-10277
A study to explore the use of orbital remote sensing to determine native arid plant distribution
[E74-10818] N75-10544
Development and astronomical application of a high quantum efficiency infrared upconverter
[NASA-CR-140679] N75-10791
Applied optics research report
[AD-784229] N75-10794
Applied optics research report
[AD-784228] N75-10795

ARKANSAS UNIV., LITTLE ROCK.
Flow tracing fidelity of scattering aerosol in laser Doppler velocimetry
[NASA-CR-140671] N75-10357

ARMY AIR MOBILITY RESEARCH AND DEVELOPMENT LAB., MOFFETT FIELD, CALIF.
Optimal control theory investigation of proprotor/wing response to vertical gust
[NASA-TM-X-62384] N75-10057
Techniques for improving the stability of soft in-plane hingeless rotors
[NASA-TM-X-62390] N75-10058

ARMY ELECTRONICS COMMAND, FORT MONMOUTH, N.J.
Interference with aircraft radio navigation and communications by precipitation static from ice and snow clouds: Electrostatic wind tunnel experiments
[AD-784623] N75-10046
A study of stabilization techniques for small, fixed-wing, remotely piloted aircraft
[AD-784109] N75-10079

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.
Lake Erie international jetport model feasibility investigation. Report 1: Scope of study and review of available data
[AD-783463] N75-10114

ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER, CHARLOTTESVILLE, VA.
Selection of composition and heat treatment of cast magnetic alloys
[AD-783765] N75-10237
Effect of electron irradiation on mechanical properties and structure of aluminum
[AD-784321] N75-10242
Superplasticity of steel KH18N10T
[AD-784175] N75-10245
Digital modeling in statistical radio engineering
[AD-783732] N75-10294
Polarization of radar signals
[AD-783761] N75-10303
Synthesis of antenna arrays
[AD-784410] N75-10330
Some problems of aerial photographic surveying employing color and spectrozonal photographic materials
[AD-784147] N75-10430
Methods of coherent optics and holography applied to problems in antenna engineering and data processing
[AD-784337] N75-10433
Extremal boundary value problems in the theory of plasticity
[AD-784172] N75-10513
Mechanics of a deformed solid
[AD-784209] N75-10514
Comparison of various methods of flight-line three-dimensional analytic phototriangulation
[AD-783662] N75-10574
Studies in stereophotogrammetry
[AD-784425] N75-10576
Standardized wind electric power unit
[AD-783764] N75-10598
Reliability of liquid-metal induction MHD machines
[AD-784208] N75-10606
Dust storms in the Altay territory
[AD-783664] N75-10643
Statistical estimation of the light pulse deformation in the optical sounding of plane-stratified clouds
[AD-784245] N75-10654
Dust storms in the Transvolga
[AD-784174] N75-10663
Map diagram of the number of days with dust storms in the hot zone of the USSR and adjacent territories
[AD-784100] N75-10668
The frequency of the most intensive dust storms in the Ukraine
[AD-784101] N75-10669
Statokinetic reactions of man under conditions of short term weightlessness
[AD-784142] N75-10705
Food unit, based on reserves of dehydrated products, in life support systems for crews of spaceships during prolonged flights
[AD-784289] N75-10710
Commutable functional devices of the scanistor type in systems of optoelectronic information processing
[AD-783820] N75-10789
Mechanical oscillator in a luminous flux
[AD-783760] N75-10796
Devices based on thermoelectrical phenomena
[AD-783821] N75-10836
Nonequilibrium statistical thermodynamics
[AD-784411] N75-10847

ARMY LAND WARFARE LAB., ABERDEEN PROVING GROUND, MD.
Helicopter dropsight
[AD-784551] N75-10084

ARNOLD ENGINEERING DEVELOPMENT CENTER, ARNOLD AIR FORCE STATION, TENN.
Nitrogen condensation in a sonic orifice expansion flow
[AD-783254] N75-10399

ARO, INC., ARNOLD AIR FORCE STATION, TENN.
Nitrogen condensation in a sonic orifice expansion flow
[AD-783254] N75-10399

ATLANTIC RESEARCH CORP., ALEXANDRIA, VA.
Spectroscopic study of metal vapor kinetics
[AD-783275] N75-10265

ATMOSPHERIC SCIENCES LAB., WHITE SANDS MISSILE RANGE, N.MEX.
The 12808 Lance, missile no. 2212, round no. 235 APT [18 July 1974]
[AD-783476] N75-10644
The 12813A Lance, missile no. 2189, round no. 233 ECL [12 July 1974]
[AD-783475] N75-10645
The 14810A Lance missile nos. 2559/2561, round nos. 231 APT/232 APT [11 July 1974]
[AD-783474] N75-10646
The 16301 Little John missile no. 3194, round no. 715 RM[27 June 1974]
[AD-783472] N75-10647
The 12810 Lance, missile no. 2172, round no. 228 ECT [13 June 1974]
[AD-783468] N75-10648
The 16101 Little John, missle no. 3094, round no. 714 RM [19 June 1974]
[AD-783470] N75-10649
The 12811 Lance, missile no. 2242, round no. 2242, round no. 230 ECL [28 June 1974]
[AD-783473] N75-10650
The 12811 Lance, missile no. 2173, round no. 229 ECT [21 June 1974]
[AD-783471] N75-10651

ATOMIC ENERGY COMMISSION, WASHINGTON, D.C.
Coal processing: Gasification, liquefaction, desulfurization: A bibliography, 1930 - 1974
[TID-3349] N75-10578
Energy transportation, distribution, and storage
[WASH-1281-4] N75-10595

ATOMICS INTERNATIONAL, CANOGA PARK, CALIF.
Preliminary design of a Primary Loop Pump Assembly [PLPA], using electromagnetic pumps
[NASA-CR-140713] N75-10458

AUBURN UNIV., ALA.
MEGASTAR: The Meaning of Energy Growth: An Assessment of Systems, Technologies, and Requirements
[NASA-CR-120355] N75-10584
The effects of lunar cycles and diurnal rhythms on activity, exploration, and elicited aggression in rats and mice
N75-10677
The 1974 NASA-ASEE summer faculty fellowship aeronautics and space research program
[NASA-CR-120336] N75-10745

AUSTRALIAN POST OFFICE RESEARCH LABS., MELBOURNE.
Earth stations for satellite communications
[REPT-6866] N75-10280

AVCO-EVERETT RESEARCH LAB., EVERETT, MASS.
Experimental and analytical research on a two megawatt, high performance MHD generator
[AD-783267] N75-10610

B

BALL BROS. RESEARCH CORP., BOULDER, COLO.
Test program on the contamination of ultraviolet region mirrors by Apollo Telescope Mount materials
[NASA-CR-120516] N75-10772

BALLISTIC RESEARCH LABS., ABERDEEN PROVING GROUND, MD.
Vapor screen techniques development at the Ballistic Research Laboratories
[AD-784077] N75-10116
Response of boron-epoxy composite to impact loading
[AD-784600] N75-10191
Light refraction by mean temperature gradients in the near-earth atmosphere
[AD-783484] N75-10790

BATTELLE COLUMBUS LABS., OHIO.
Characterization of metals melting discs Skylab experiment M551
[NASA-CR-129041] N75-10118
Single crystals of metal solid solutions
[NASA-CR-120511] N75-10225
Research on synthesis of high-strength aluminum alloys. Part 2: Control of grain structure during hot working
[AD-783353] N75-10239
An atomic model of an environmentally-affected crack in BCC iron
[AD-783725] N75-10241
Atomic crack simulation in fracture mechanics
[AD-783724] N75-10243
The interaction between line force arrays and planar cracks
[AD-783704] N75-10244
Reduction of errors in ceramic bend tests
[AD-784435] N75-10256
The collection, generation, and analysis of MIL-HDBK-5 allowable design data
[AD-783616] N75-10506
Interaction of marine geodesy, satellite technology and ocean physics
[NASA-CR-137470] N75-10671
Bistatic radar sea state monitoring
[NASA-CR-137469] N75-10673

BELL HELICOPTER CO., FORT WORTH, TEX.
Low temperature testing of an AH-1G helicopter equipped with elastomeric flapping and feathering bearings in the main rotor
[AD-784189] N75-10081

BENDIX CORP., KANSAS CITY, MO.
Protection of glass tubes in epoxy encapsulation
[BDX-613-931-REV] N75-10188
Vibratory deburring
[BDX-613-735-REV] N75-10268
Automated scheduling of manufacturing resources
[BDX-613-1077] N75-10269
Mechanical deburring of plastics
[BDX-613-988-REV] N75-10270
Effect of rapidly changing voltages on thick-film resistors
[BDX-613-1085-REV] N75-10314
Ferrite-core transformer bonding and potting
[BDX-613-992] N75-10315
Removal of insulation from multiconductor wire tape using a carbon dioxide laser
[BDX-613-887-REV] N75-10437
Insulation removal from woven-wire tape
[BDX-613-1067-REV] N75-10438
Ultrasonic welding of electrical terminations
[BDX-613-1016] N75-10460
Control of electrostatic damage to solid state devices
[BDX-613-1080] N75-10830

BOEING CO., KENT, WASH.
Quantitative determination of stratospheric aerosol characteristics
[E74-10808] N75-10535
BOEING CO., WICHITA, KANS.
Acoustic grazing flow impedance using waveguide principles
[NASA-CR-120848] N75-10351
BOEING COMMERCIAL AIRPLANE CO., SEATTLE, WASH.
Scale model testing of the jet noise characteristics of the JT8D refan engine nozzle system
[NASA-CR-134618] N75-10091
BOEING VERTOL CO., PHILADELPHIA, PA.
Model 301 HLH/ATC [Heavy Lift Helicopter/Advanced Technology Component] transmission noise reduction program
[AD-784132] N75-10063
Technology development report: Results of static electricity discharge system tests [active and passive] heavy lift helicopter
[AD-784130] N75-10082
HLH/ATC engine shaft support bearing development program
[AD-784593] N75-10097
BOSTON UNIV., MASS.
The social cost of airport noise as measured by rental changes: The case of Logan Airport
N75-10849
BRITISH AIRCRAFT CORP. [OPERATING] LTD., BRISTOL [ENGLAND].
Study of an interface structure design, phase 1
[ESS/SS-526] N75-10160
BRITISH BROADCASTING CORP., KINGSWOOD [ENGLAND].
Arrays of UHF log-periodic aerials: A vertically-polarised receiving aerial for re-broadcast links
[BBC-RD-1974/30] N75-10274
UHF amplifiers: Improvement of linearity by pre-correction
[BBC-RD-1974/32] N75-10275
Laser beam deflection
[BBC-RD-1974/31] N75-10434
BROOKHAVEN NATIONAL LAB., UPTON, N.Y.
CRYSNET: A network of intelligent remote graphics terminals
[BNL-18772] N75-10716
BUREAU OF MINES, ALBANY, OREG.
Room temperature tensile properties of titanium and seven titanium alloys prepared by skull casting
[BM-RI-7949] N75-10208
Thermodynamics of the Al-Si system
[PB-234070/1] N75-10846
BUREAU OF MINES, BARTLESVILLE, OKLA.
Geochemistry of liquids, gases, and rocks from the Smackover formation
[PB-233427/4] N75-10525
BUREAU OF MINES, DALLAS, TEX.
Profitability analysis of producing crude oil by waterflooding using a simulation technique
[BM-IC-8652] N75-10582
BUREAU OF MINES, DENVER, COLO.
Computer program for nonlinear regression using least squares
[BM-IC-8649] N75-10720
BUREAU OF MINES, LARAMIE, WYO.
Preliminary evaluation of underground coal gasification at Hanna, Wyoming
[BM-TPR-82] N75-10599
BUREAU OF MINES, MORGANTOWN, W.VA.
An economic analysis of oil shale operations featuring gas combustion retorting
[BM-TPR-81] N75-10579
BUREAU OF MINES, ROLLA, MO.
Recycling of plastics from urban and industrial refuse
[BM-RI-7955] N75-10267
BUREAU OF MINES, TWIN CITIES, MINN.
Thermal diffusivity of six igneous rocks at elevated temperatures and reduced pressures
[NASA-CR-140577] N75-10562
Dielectric constants and dissipation factors of simulated lunar rocks
[PB-234053/7] N75-10575
BUREAU OF MINES, WASHINGTON, D.C.
Technologic and related trends in the mineral industries, 1973
[PB-233997/6] N75-10271
BUSINESS AND TECHNOLOGICAL SYSTEMS, INC., SEABROOK, MD.
Computations of M sub 2 and K sub 1 ocean tidal perturbations in satellite elements
[NASA-CR-139124] N75-10851

C

CALIFORNIA UNIV., BERKELEY.
In vivo measurement of human body composition
[NASA-CR-140668] N75-10690
Conical electrostatic probe response in a weakly ionized gas flow
[AD-783261] N75-10815
Studies of spin-wave mode-locking and phonon magnon interaction and the potential use of the effects for device applications
[AD-784676] N75-10838
High angular resolution and position determinations by infrared interferometry
[NASA-CR-140670] N75-10877
CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
Research highlights 1974 fiscal
[PUBL-84/7M] N75-10522
Application of the classical theory of electrons in gases to multiwire proportional and drift chambers
[LBL-3013] N75-10828
CALIFORNIA UNIV., DAVIS.
A numerical study of protostellar formation
N75-10874
CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Influence of thermomechanical treatment on the tensile properties of a platinum 25 wt percent iridium alloy
[UCRL-75630] N75-10229
Low temperature thermophysical and mechanical properties of high purity platinum-25 w/o iridium alloy
[UCRL-75278] N75-10230
Tensile properties of an ultrahigh-strength graphite fiber in an epoxy matrix
[UCRL-75209] N75-10253
Critical energy for shock initiation of tetryl and A-5
[UCID-16469] N75-10260
US energy flow charts for 1950, 1960, 1970, 1980, 1985, and 1990
[UCRL-51487] N75-10593
Rationale for setting priorities for new energy technology research and development
[UCRL-51511] N75-10594
Comparison of the Southern and Northern Hemisphere general circulation characteristics as determined by satellite ozone data
[UCRL-75556] N75-10638
High purity germanium-low temperature Hall analyses
[UCRL-74832] N75-10831
CALIFORNIA UNIV., LOS ANGELES.
A methodology for determining the flight system mix of an air transfer route structure
N75-10033
Particle size distribution effects in precipitation hardening
[UCLA-34-P-172-11] N75-10232
High frequency electromagnetic wave backscattering from radially inhomogeneous dielectric spheres
N75-10742
Is Jupiter's magnetosphere like a pulsar's or earth's?
[NASA-CR-140600] N75-10889
CALIFORNIA UNIV., SAN DIEGO.
A simple method for the generation of organ and vessel contours from roentgenographic or fluoroscopic images
[NASA-CR-140685] N75-10693
Emission and absorption lines of QSOs and properties of the gas that produces them
N75-10763
CALIFORNIA UNIV., SANTA CRUZ.
Observations of lithium dilution and rotational velocity decay in F and G giant stars
N75-10873
CAMBRIDGE UNIV. [ENGLAND].
Pressure distribution on two wings with curved leading edges at supersonic speeds
[ARC-R/M-3741] N75-10028
Free-stream turbulence effects on the turbulent boundary layer
[ARC-CP-1282] N75-10380
CANADA CENTRE FOR REMOTE SENSING, OTTAWA [ONTARIO].
The Canadian ERTS program
N75-10550
CARNEGIE-MELLON UNIV., PITTSBURGH, PA.
Optimal material systems for frame buildings subjected to solar heating
N75-10480
CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO.
Orthopositronium annihilation in liquid and solid helium
N75-10762
Charged particle beam-plasma interactions for thermonuclear power generation
[AD-782060] N75-10812
Vortex ring generated level differences in superfluid helium
N75-10818
CATHOLIC UNIV. OF AMERICA, WASHINGTON, D.C.
The stability of parallel flows between plane boundaries of two superposed viscoelastic fluids
N75-10337
Parameters governing the erosion resistance of coating substrate systems
[AD-784496] N75-10467
CENTRAAL INSTITUUT VOOR VOEDINGSONDERZOEK TNO, ZEIST [NETHERLANDS].
Effect of stress on fat metabolism in connection with fat contents of emergency rations
[R-4255] N75-10680
CENTRE DE RECHERCHES SCIENTIFIQUES ET TECHNIQUES DE L'INDUSTRIE DES FABRICATIONS METALLIQUES, BRUSSELS [BELGIUM].
Plane strain fracture toughness testing on center-cracked plates under uniform tension
[CRIF-MT-91] N75-10500
CERAMIC FINISHING CO., STATE COLLEGE, PA.
Strengthening of oxidation resistant materials for gas turbine applications
[NASA-CR-134661] N75-10092
Comparisons of fracture mirrors in flint glass fractured under various loading conditions
[AD-784489] N75-10258
CHESAPEAKE RESEARCH CONSORTIUM, INC., BALTIMORE, MD.
A survey for the use of remote sensing in the Chesapeake Bay region
[NASA-CR-137476] N75-10571
CHRYSLER CORP., NEW ORLEANS, LA.
Aerodynamic results of support system interference effects tests conducted in NASA/ARC 6 by 6-foot supersonic wind tunnel using an 0.015-scale model of the configuration 140A/B SSV orbiter [OA59], volume 1
[NASA-CR-134410] N75-10108
Aerodynamic results of support system interference effects tests conducted in NASA/ARC 6 by 6-foot supersonic wind tunnel using a 0.015 scale model of the configuration 140A/B SSV orbiter, volume 2
[NASA-CR-134412] N75-10109
Effects of reaction control system jet flow field interactions on the aerodynamic characteristics of a 0.010-scale space shuttle orbiter model in the Langley Research Center 31 inch CFHT [OA85]
[NASA-CR-134111] N75-10148
Static stability characteristics of the space shuttle external tank [MSFC model 458] during reentry in the MSFC 14-inch TWT [TA1F]
[NASA-CR-134420] N75-10151
Effect of ELEVON gap configurations on the longitudinal stability and control effectiveness of the 43-0 space shuttle orbiter [OA118]
[NASA-CR-134407] N75-10152
Effects of air breathing engine plumes on SSV orbiter subsonic wing pressure distribution, volume 2
[NASA-CR-134417] N75-10153
Pressure and heat flux results from the space shuttle/external fuel tank interaction test at Mach numbers 16 and 19
[NASA-CR-134418] N75-10154
Results of reaction control system on-orbit jet simulation using an 0.0175-scale configuration 3 space shuttle orbiter model [21-0] in the LaRC 60-foot vacuum sphere
[NASA-CR-134415] N75-10170
Results of an investigation of hypersonic viscous interaction effects on an 0.01 scale space shuttle orbiter 51-0 model in the AEDC-VKE hypervelocity wind tunnel
[NASA-CR-134423] N75-10360
CINCINNATI UNIV., OHIO.
Erosion in radial inflow turbines. Volume 3: Trajectories of erosive particles in radial inflow turbines
[NASA-CR-134700] N75-10087
Dehydriding of titanium alloy [Ti-6246] hydrided powder
[AD-783235] N75-10249
CITY COLL. OF THE CITY OF NEW YORK.
Atmospheric response to variations in sea surface temperature
[NASA-CR-140604] N75-10672
COLORADO SCHOOL OF MINES, GOLDEN.
Geologic and mineral and water resources investigations in Western Colorado, using Skylab EREP data
[E74-10802] N75-10530
COLORADO STATE UNIV., FORT COLLINS.
Turbulence induced changes in vortex shedding from a circular cylinder
N75-10336
Bouyancy effects on a turbulent shear flow
[AD-784438] N75-10398
COLORADO UNIV., BOULDER.
Heat transport in porous insulations at cryogenic temperatures
N75-10339
Accretion flows onto galactic X-ray sources
N75-10898
COLUMBIA UNIV., NEW YORK.
Research investigation directed toward extending the useful range of the electromagnetic spectrum
[NASA-CR-140678] N75-10272
COMMITTEE ON APPROPRIATIONS [U. S. HOUSE].
Public works for water and power development and Atomic Energy Commission Appropriation Bill, 1975. Part 6: Tennessee Valley Authority
[GPO-32-403] N75-10859

COMMITTEE ON APPROPRIATIONS [U. S. SENATE].
Proposed international air shuttle, 1975
[GPO-31-527] N75-10034
COMMITTEE ON COMMERCE [U. S. SENATE].
Limit lead in gasoline
[GPO-29-660] N75-10259
Earthquakes
[GPO-28-577] N75-10516
Metric conversion act of 1973
[GPO-27-065] N75-10862
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS [U. S. SENATE].
Economic impact of the oil shale industry in western Colorado
[GPO-28-608] N75-10588
National Environmental Policy Act of 1969. Environmental indices, status of development pursuant to Sections 102[2][B] and 204 of the act
[GPO-25-314] N75-10617
Market performance and competition in the petroleum industry, part 2
[GPO-28-740] N75-10855
National Crude Oil Refinery Development Act, part 2
[GPO-35-578] N75-10860
The National Coal Conversion Act and the National Crude Oil Refinery Development Act
[GPO-28-964] N75-10861
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE [U. S. HOUSE].
Independent truckers and the energy crisis
[GPO-31-412] N75-10581
New motor vehicle emission standards and fuel economy
[GPO-29-272] N75-10863
COMMITTEE ON LABOR AND PUBLIC WELFARE [U. S. SENATE].
Effects of energy crisis on education, 1974
[GPO-27-765] N75-10850
COMMITTEE ON MERCHANT MARINE AND FISHERIES [U. S. HOUSE].
High Seas Oil Port Act
[H-REPT-93-1042] N75-10858
COMMITTEE ON PUBLIC WORKS [U. S. SENATE].
Implementation of the Noise Control Act of 1972 [aircraft-airport noise], part 2
[GPO-33-871] N75-10864
COMMITTEE ON SCIENCE AND ASTRONAUTICS [U. S. HOUSE].
Research, development, and the energy crisis
[GPO-27-032] N75-10580
Advanced nuclear research
[GPO-41-253] N75-10764
COMMITTEE ON WAYS AND MEANS [U. S. SENATE].
Third annual report on the financial condition and results of the operation of the Airport and Airway Trust Fund
[H-DOC-93-230] N75-10854
Elimination of duty on methanol imported for certain uses
[H-REPT-93-998] N75-10857
Oil and Gas Energy Tax Act of 1974
[H-REPT-93-1028-PT-2] N75-10866
COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, MELBOURNE [AUSTRALIA].
The PUCE programme for terrain evaluation for engineering purposes. 2: Procedures for terrain classification
[PB-233847/3] N75-10625
COMPAGNIA GENERALE DI ELETTRICITA S.P.A., MILAN [ITALY].
Testing of NiCd cells over geostationary orbit type cycling period
[ESRO-CR[P]-504] N75-10596
COMPUTER SCIENCES CORP., FALLS CHURCH, VA.
TDRSS data handling and management system study. Ground station systems for data handling and relay satellite control
[NASA-CR-139128] N75-10289
Access control and processing studies for ground satellite mobile communications/surveillance systems
[AD-784380] N75-10291
CONNECTICUT UNIV., STORRS.
Heat transfer characteristics of an impinging jet in a crossflow
N75-10344
Lifetime prediction methods for elevated temperature fatigue
N75-10493
CORNELL UNIV., ITHACA, N.Y.
Hydrogen brittleness in hydrogen and hydrogen-oxygen gas mixtures
[COO-3166-6] N75-10231
Evaluation of Skylab imagery as an information service for investigating land use and natural resources
[E74-10730] N75-10526
Using the OCS complot DP-1 plotter
[NASA-CR-140602] N75-10722
Secondary high pressure standard for the far-infrared spectral region
[COO-3151-37] N75-10832
CORPS OF ENGINEERS, WASHINGTON, D.C.
ERTS program of the US Army Corps of Engineers
N75-10554
CRAMER [H.E.] CO., INC., SALT LAKE CITY, UTAH.
Meteorological study for Tooele Army Depot, Volume 1
[AD-784572] N75-10666
Meteorological study for Tooele Army depot, volume 2
[AD-784573] N75-10667

D

DARTMOUTH COLL., HANOVER, N.H.
Investigation of land use of northern megalopolis using ERTS-1 imagery
[NASA-CR-2459] N75-10545
The optical spectrum of Sco X-1
N75-10872
DEFENCE RESEARCH ESTABLISHMENT OTTAWA [ONTARIO].
Operation of air cathodes in the presence of hydrazine
[AD-783241] N75-10611
DEFENCE SCIENTIFIC INFORMATION SERVICE, OTTAWA [ONTARIO].
Implementation of a mini-computer based information system. Part 1: System overview
[DSIS-TN-16-PT-1] N75-10725
DELAWARE UNIV., NEWARK.
Canonical formulation of instantaneous electrodynamics, gravitation
N75-10620
DENVER UNIV., COLO.
Surface structure and applied stress in corrosion rate
[AD-783402] N75-10247
DEPARTMENT OF THE TREASURY, WASHINGTON, D.C.
Third annual report on the financial condition and results of the operation of the Airport and Airway Trust Fund
[H-DOC-93-230] N75-10854
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BAD GODESBERG [WEST GERMANY].
Investigations on the day-night-differences of physical performance capacity
[DLR-FB-74-29] N75-10697
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BRUNSWICK [WEST GERMANY].
Application of multispectral color photography to flame flow visualization
[DLR-MITT-74-23] N75-10420
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, GOETTINGEN [WEST GERMANY].
Scattering of background molecules in free jet expansions studied by free molecular flat plate drag measurements
[DLR-FB-74-16] N75-10379
Skimming of molecular beams from diverging non-equilibrium gas jets
[DLR-FB-74-28] N75-10761
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, OBERPFAFFENHOFEN [WEST GERMANY].
Dynamic simulation facility for satellite attitude control systems
[BMFT-FB-W-74-02] N75-10159
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, PORZ [WEST GERMANY].
Determination of aerodynamic derivatives using the discrete Fourier transformation of transient oscillations
[DLR-FB-74-17] N75-10018
Laser in aerodynamic testing: Local measuring methods
[DLR-MITT-74-09] N75-10440
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, STUTTGART [WEST GERMANY].
Routing of-aircraft and economics of flight operations
[DLR-FB-74-25] N75-10040
DEUTSCHES GEODAETISCHES FORSCHUNGSINSTITUT, MUNICH [WEST GERMANY].
Observation equations for resonance parameters of the 13th Order from the orbit analysis of GEOS B, BE-C, and D1D satellites
[SER-C/DISS-198] N75-10132
DRAPER [CHARLES STARK] LAB., INC., CAMBRIDGE, MASS.
An adaptive technique for a redundant-sensor navigation system
[NASA-CR-140313] N75-10042

E

EARTH SATELLITE CORP., WASHINGTON, D.C.
An evaluation of the suitability of ERTS data for the purposes of petroleum exploration
N75-10553
ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE [SWITZERLAND].
Experimental and computational study of the low-density plasma in the outer regions of a theta pinch
[LRP-85/74] N75-10808
ENERGIYA PUBLISHING HOUSE, MOSCOW [USSR].
Micro-electric motors running on a pulsating current on constant voltage
N75-10308
ENVIRONMENTAL DATA SERVICE, BOULDER, COLO.
United States earthquakes, 1972
N75-10520
ENVIRONMENTAL PROTECTION AGENCY, RESEARCH TRIANGLE PARK, N.C.
Air pollution translations: A bibliography with abstracts, volume 5
[PB-233374/8] N75-10619
ENVIRONMENTAL RESEARCH INST. OF MICHIGAN, ANN ARBOR.
Simultaneous dual-band radar development
[NASA-CR-140303] N75-10283
Developing processing techniques for Skylab data
[E74-10799] N75-10527
Utility of ERTS for monitoring the breeding habit of migratory waterfowl
N75-10557
The application of remote sensing techniques: Technical and methodological issues
[NASA-CR-140674] N75-10564
Passive infrared systems
N75-10784
ESL, INC., SUNNYVALE, CALIF.
Major RFI conditions effecting TDRSS
[NASA-CR-139135] N75-10281
The effect of radio frequency interference on the 136- to 138-MHz return link and 400.5- to 401.5-MHz forward link of the Tracking and Data Relay Satellite System
[NASA-CR-139136] N75-10282
Preliminary assessment of RFI impacts on TDRSS in the 2- to 2.3 GHz band
[NASA-CR-139125] N75-10287
EUROPEAN SPACE OPERATIONS CENTER, DARMSTADT [WEST GERMANY].
Comments on observations with very long baseline radio interferometers for position determination
N75-10419
EUROPEAN SPACE RESEARCH ORGANIZATION, PARIS [FRANCE].
Aerospace Research
[ESRO-TT-90] N75-10011
On the flow around the leading edge of an aerofoil
N75-10012
Methods of visualizing the leading edge separation bubble and analysis of the results
N75-10013
Recent improvements in the light element microanalyser
N75-10014
An experimental study of the thermal decomposition of an ablative material
N75-10015
Lifting surface theory applied to fixed wings and propellers
N75-10016
Analysis of spectral density curves in wind tunnel flutter measurements
N75-10017
Estimation of the characteristics of various flare profiles
[ESRO-TT-89] N75-10031
Optimum transient response characteristic of a VTOL aircraft with direct side force control
[DLR-FB-73-72] N75-10103
Investigation of the thermal load of rooms as a result of solar radiation through windows by laboratory experiments using simulated global radiation
[DLR-FB-73-73] N75-10111
Orbit determination for deep space missions by means of Doppler and ranging
[ESRO-TT-80] N75-10146
Heat transfer investigations of a regeneratively cooled, 1 kN thrust, fluorine/ammonia engine
[ESRO-TT-93] N75-10173
Investigation on the influence of temperature and specimen geometry on the fracture toughness properties of TiAl6V4
[ESRO-TT-75] N75-10234
Influence of gas particles adsorbed on the solid surface and influence of structure on the gas-solid interaction measured by molecular beam scatter
[ESRO-TT-84] N75-10235
Theoretical performance of organic polymers in hybrid engines with hydrogen peroxide as oxidizer
[ESRO-TT-94] N75-10262

About the use of lithium-containing propellants in rocket propulsion units with FLOX as oxidizer. Part 1: Parameter study
[ESRO-TT-87] N75-10263
Real-time measuring procedure and measuring equipment for recording the radiation patterns of aircraft antennas in flight
[ESRO-TT-74] N75-10292
Aerospace Research
[ESRO-TT-40] N75-10367
Dual mode ramjet theoretical and experimental performance for Mach 3.5 to 7 domain of flight velocities
N75-10368
Time-dependent methods for computing wall effects in two-dimensional supercritical flow
N75-10369
Analog simulation of the small perturbation equation applied to transonic flows
N75-10370
Determination of the dynamic characteristics of a structure from a vibration test performed with only one excitation point
N75-10371
Piston unit for rate modulation of a liquid flow
N75-10372
The influence of aerodynamic parameters on the rate of erosion rate caused by the impact of a liquid droplet at the stagnation point of a body flying at supersonic speed
[ESRO-TT-86] N75-10374
Calculation of the plane supersonic flow through cascades using the method of analytical characteristics
[ESRO-TT-78] N75-10383
Second order boundary layer theory for steady, laminar, compressible flow on curved surfaces
[ESRO-TT-85] N75-10384
A multi-parameter integral method for the calculation of incompressible laminar and temperature boundary layers
[ESRO-TT-88] N75-10385
Drag measurements on plates parallel to the flow, and on discs perpendicular to the flow, in supersonic highly rarefied free jets
[ESRO-TT-91] N75-10386
Influence of the viscous interaction parameter on the aerodynamic coefficients and on the heat transfer of a reentry body at very low densities for the whole region of angle of attack
[ESRO-TT-95] N75-10387
Calculation of inductive plasma accelerators with sinusoidal electromagnetic standing waves for continuous energy supply
[ESRO-TT-76] N75-10809

F

FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C.
Service C weather schedules
[FAA-7330.7I] N75-10630
FLORENCE UNIV. [ITALY].
A study on data-compression techniques
[ESRO-CR-93] N75-10717
FLORIDA INST. OF TECH., MELBOURNE.
A study of lagoonal and estuarine processes in the area of Merritt Island encompassing the space center
[NASA-CR-140601] N75-10670
FLORIDA STATE UNIV., TALLAHASSEE.
The Coho Project: Living resources prediction feasibility study, volume 1
[PB-234057/8] N75-10681
The Coho Project: Living resources prediction feasibility study. Volume 2: Environmental report
[PB-234058/6] N75-10682
The Coho Project: Living resources prediction feasibility study. Volume 3: System evaluation report
[PB-234059/4] N75-10683
FLORIDA TECHNOLOGICAL UNIV., ORLANDO.
Ecological effects and environmental fate of solid rocket exhaust
[NASA-CR-140598] N75-10616
FLOW RESEARCH, INC., KENT, WASH.
A viscous/potential flow interaction analysis method for multi-element infinite swept wings, volume 1
[NASA-CR-2476] N75-10358
FLYING PERSONNEL RESEARCH COMMITTEE, LONDON [ENGLAND].
The generation of saccadic eye movements in vestibular nystagmus
[AD-784128] N75-10700
FMC CORP., PRINCETON, N.J.
Char oil energy development
[PB-233263/3] N75-10603
FORSCHUNGSINSTITUT FUER ANTHROPOTECHNIK, MECKENHEIM [WEST GERMANY].
Methods of investigation for manual control processes
[FB-15] N75-10738
FORSVARETS TELETEKNISKA LAB., STOCKHOLM [SWEDEN].
Present-day status of accelerated testing of trimming potentiometers
[ESRO-CR-167] N75-10472
Present-day status of accelerated testing of fixed capacitors
[ESRO-CR-168] N75-10473
Present-day status of accelerated testing of integrated circuits
[ESRO-CR-169] N75-10474
Present day status of accelerated testing of diodes and transistors
[ESRO-CR-170] N75-10475
Present-day status of accelerated testing of fixed resistors
[ESRO-CR-166] N75-10478
FRANKFORD ARSENAL, PHILADELPHIA, PA.
An experimental determination of long wavelength phonons and anomalous dielectric behavior in proustite and pyrargyrite
[AD-784309] N75-10841

G

GENERAL DYNAMICS CORP., SAN DIEGO, CALIF.
Infrared water vapor and temperature profiler
[AD-783984] N75-10661
GENERAL DYNAMICS/CONVAIR, SAN DIEGO, CALIF.
An improved heat exchanger
[NASA-CASE-MFS-22991-1] N75-10366
GENERAL ELECTRIC CO., CINCINNATI, OHIO.
Highly loaded multi-stage fan drive turbine: Performance of final three configurations
[NASA-CR-2446] N75-10089
GENERAL ELECTRIC CO., PHILADELPHIA, PA.
CO2 MHD laser: Analysis, design and shock tunnel experiments
[AD-782226] N75-10443
ERTS 1 flight evaluation report, 23 October 1973 - 23 January 1974
[NASA-CR-140712] N75-10546
ERTS 1 flight evaluation report, 23 January - 23 April 1974
[NASA-CR-140810] N75-10547
ERTS 1 flight evaluation report, January 23, 1973 to April 23, 1973
[NASA-CR-140809] N75-10548
ERTS 1 flight evaluation report, 23 April 1974 23 July 1974
[NASA-CR-140711] N75-10568
GENERAL ELECTRIC CO., SCHENECTADY, N.Y.
Isolated rotor noise due to inlet distortion or turbulence
[NASA-CR-2479] N75-10094
Summary of the Laser Raman Workshop on the measurement of gas properties
[AD-782562] N75-10390
GENERAL MOTORS CORP., INDIANAPOLIS, IND.
Imminent engine failure probe investigation
[AD-783823] N75-10098
GENERAL TELEPHONE AND ELECTRONICS LABS., INC., BAYSIDE, N.Y.
An investigation of the experience and implications of using non Hi-Rel components in European scientific experiments. Volume 1: Summary
[GT-7310-VOL-1] N75-10476
An investigation of the experience and implications of using non Hi-Rel components in European scientific experiments. Volume 2: Main report
[GT-7310-VOL-2] N75-10477
GEOLOGICAL SURVEY, ATLANTA, GA.
Geologic evaluation and applications of ERTS-1 imagery over Georgia
N75-10552
GEOLOGICAL SURVEY, MIAMI, FLA.
Surface water modeling Everglades Water Basin, Florida
[E74-10814] N75-10540
GEOLOGICAL SURVEY, RESTON, VA.
Overall evaluation of ERTS-1 imagery for cartographic application
[E74-10800] N75-10528
Dynamics of suspended sediment plumes in Lake Ontario
[E74-10815] N75-10541
GEOLOGICAL SURVEY, TACOMA, WASH.
Evaluate ERTS imagery for mapping and detection of changes of snowcover on land and on glaciers
[E74-10812] N75-10539
GEORGE WASHINGTON UNIV., WASHINGTON, D.C.
Theoretical solutions to problems introduced by the TWA in multiple access communication systems
N75-10279
GEORGIA INST. OF TECH., ATLANTA.
Temperature dependence of the magnetic excitations in iron and nickel
N75-10205
Design of digital moving target indication radar processors
N75-10278
GOODYEAR AEROSPACE CORP., AKRON, OHIO.
Slow descent recovery system technology study and data program
[AD-783268] N75-10032
GRUMMAN AEROSPACE CORP., BETHPAGE, N.Y.
Development of an apparatus to measure thermophysical properties of wind tunnel heat transfer models
[NASA-CR-2434] N75-10104
Research study on materials processing in space experiment number M512: Nickel - 12 wt percent tin alloy evaluation
[NASA-CR-129038] N75-10119
Thermal-structural evaluation of TD Ni-20Cr thermal protection system panels
[NASA-CR-132487] N75-10155
Effect of water on the properties of a glass-polyimide laminate
[RM-589] N75-10186
Thermoelastic heat effects in equiatomic NiTi
[RM-592] N75-10226
Heat pipe manufacturing study
[NASA-CR-139140] N75-10347
Self-excited superturbulence: The whistler nozzle
[RE-488] N75-10363
A model for gas-surface distribution functions
[RM-591] N75-10829
GTE SYLVANIA, INC., WALTHAM, MASS.
Sealed lithium inorganic electrolyte cell
[AD-784072] N75-10612

H

HALE OBSERVATORIES, PASADENA, CALIF.
Memory systems for signal generating photoelectric image detectors
[NASA-CR-140669] N75-10408
Absolute spectrophotometry in M31 and M32
[NASA-CR-140683] N75-10879
Infrared, radio, and X-ray observations of Cygnus X-3
[NASA-CR-140680] N75-10882
HARRY DIAMOND LABS., WASHINGTON, D.C.
Statistical mechanics of one-dimensional single component Landau-Ginzburg fields
[AD-783477] N75-10848
HARVARD UNIV., CAMBRIDGE, MASS.
Continuous silicon solar cells
[PB-233949/7] N75-10602
HAWAII UNIV., HONOLULU.
Some statistical analyses of Hawaiian rainfall
[PB-233674/1] N75-10656
HAWKER SIDDELEY DYNAMICS, LTD., HATFIELD [ENGLAND].
ESRO Nimra conversion study
[HSD-TP-7472] N75-10133
HONEYWELL, INC., MINNEAPOLIS, MINN.
Yaw axis stability augmentation system flight test report
[AD-784134] N75-10083
HONEYWELL, INC., ST. PETERSBURG, FLA.
Computer functional requirements study, volume 1
[AD-782078/0] N75-10719
HUGHES AIRCRAFT CO., CULVER CITY, CALIF.
Electromagnetic radiation screening of microcircuits for long life applications
[NASA-CR-120512] N75-10311
Display devices and their use in avionics systems
N75-10778
Versatile data handling system study
[NASA-CR-139123] N75-10853
HUGHES AIRCRAFT CO., FULLERTON, CALIF.
Burst processor tapped delay line
[AD-779473] N75-10331

I

IIT RESEARCH INST., CHICAGO, ILL.
Vehicular variable-parameter METRRA system
[AD-782214] N75-10295
ILLINOIS INST. OF TECH., CHICAGO.
The mobility of coincidence and near coincidence grain boundaries
[AD-782908] N75-10236
ILLINOIS UNIV., CHICAGO.
Static and dynamic buckling of shallow arches
N75-10482
ILLINOIS UNIV., SAVOY.
Effects of ground-based aircraft simulator motion conditions upon prediction of pilot proficiency, part 1
[AD-783256] N75-10112
Effects of ground based aircraft simulator motion conditions upon prediction of pilot proficiency, part 2
[AD-783257] N75-10115
ILLINOIS UNIV., URBANA.
Study of the feasibility of using a sailplane as an instrument platform for the study of wake vortex phenomena
[NASA-CR-140603] N75-10086
Significance of cyclic history dependent deformation phenomena of metals on fatigue life estimation
[AD-784297] N75-10507

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON [ENGLAND].
Measurements in a turbulent horseshoe vortex and the problem of probe interference
[IC-AERO-73-08] N75-10375
On the measurement of intermittency in turbulent flow
[IC-AERO-74-04] N75-10376
Measurements of turbulent boundary layer growth over a longitudinally curved surface
[IC-AERO-74-05] N75-10377
Influence of the side walls on the turbulent centre-plane boundary layer in a square duct
[IC-AERO-74-06] N75-10382
INFORMATICS, INC., ROCKVILLE, MD.
Soviet satellite geodesy: Basis and status of Soviet laser geodesy and long-base line interferometry
[AD-781138/3] N75-10524
Bibliography of Soviet material on internal waves, January - March 1974
[AD-782018] N75-10675
INSTITUT FRANCO-ALLEMAND DE RECHERCHES, ST. LOUIS [FRANCE].
A method for identifying large particles in laser anemometry
[ISL-37/73] N75-10441
INSTITUT FUER FESTKOERPERMECHANIK, FREIBURG [WEST GERMANY].
Interaction between parallel cracks in layered composites
[WB-5/73] N75-10501
Activities of the Solid State Technology Institute N75-10502
INSTITUTE FOR PERCEPTION RVO-TNO, SOESTERBERG [NETHERLANDS].
Optimal light characteristics for battery operated navigation lights
[IZF-1974-8] N75-10044
INSTITUTE FOR TELECOMMUNICATION SCIENCES, BOULDER, COLO.
Fine structure precipitation effects and possible remedial techniques on 15 GHz line-of-sight radio links
[AD-784096] N75-10305
INTERMETRICS, INC., CAMBRIDGE, MASS.
HAL/S language specification
[NASA-CR-140279] N75-10101
HAL/S-360 user's manual
[NASA-CR-140255] N75-10102
INTERNATIONAL BUSINESS MACHINES CORP., GAITHERSBURG, MD.
Development of programs for computing characteristics of ultraviolet radiation
[NASA-CR-139134] N75-10746
INTERNATIONAL BUSINESS MACHINES CORP., HUNTSVILLE, ALA.
Investigation of tantalum wet slug capacitor failures in the Apollo telescope mount charger battery regulator modules
[NASA-CR-120497] N75-10468
INTERNATIONAL BUSINESS MACHINES CORP., PHILADELPHIA, PA.
Three models for scheduling space shuttle missions and resources
[NASA-CR-140319] N75-10127
INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS, ROME [ITALY].
Modelling for the first GARP global experiment
[GARP-PUBL-14] N75-10639
Report of the meeting on drifting buoys for the first GARP global experiment
[GARP-SPEC-REPT-13] N75-10674
IOWA UNIV., IOWA CITY.
Numerical modeling of unsteady flow with natural and forced separation N75-10338
Pioneer 10: Observations of energetic electrons in the Jovian magnetosphere
[NASA-CR-140676] N75-10888
ISRAEL PROGRAM FOR SCIENTIFIC TRANSLATIONS, LTD., JERUSALEM.
Studies in atmospheric electricity
[TT-74-50008] N75-10623
IZDATELSTVO KAMENYAR, LVOV [USSR].
Progressive methods of producing microcircuits N75-10307
IZDATELSTVO NAUKA, MOSCOW [USSR].
Electroluminescence of crystals N75-10822

J

JET PROPULSION LAB., CALIF. INST. OF TECH., PASADENA.
Trajectory selection for the Mariner Jupiter/Saturn 1977 project
[NASA-CR-140704] N75-10142
Mariner Mars 1971 attitude control subsystem
[NASA-CR-140706] N75-10168
Viking Orbiter 1975 thrust vector control system accuracy
[NASA-CR-140705] N75-10169
Zero torque gear head wrench
[NASA-CASE-NPO-13059-1] N75-10456
Self-sterilization of bodies during outer planet entry
[NASA-CR-140808] N75-10678
Planetary quarantine: Space research and technology
[NASA-CR-140806] N75-10707
Consideration of probability of bacterial growth for Jovian planets and their satellites
[NASA-CR-140807] N75-10712
Symbolic integration of a class of algebraic functions
[NASA-CR-140707] N75-10730
Mariner Mars 1971 television picture catalog. Volume 1, addendum 1: Experiment design and picture data
[NASA-CR-140700] N75-10890
JOHNS HOPKINS UNIV., BALTIMORE, MD.
Apollo 17 ultraviolet spectrometer experiment [S-169]
[NASA-CR-140316] N75-10128
Research on turbulent diffusion
[COO-3284-3] N75-10373
JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
Electroslag remelting
[JPRS-63220] N75-10212
Some characteristics of the thermal operation of an electroslag remelting furnace crystallizer with a broadened slag top N75-10213
Indirect determination of specific heat fluxes in the crystallizer wall during EShP N75-10214
Electroslag remelting during production of sheet steel N75-10215
Electroslag remelting in multipass crystallizers N75-10216
Prospects of manufacturing crankshafts for ship's diesels by the electroslag casting method N75-10217
Use of electroslag technique in manufacture of cold-rollers N75-10218
Electroslag smelting of large-size hollow billets N75-10219
Some characteristics of EShP of metal in consumable crystallizers N75-10220
Mechanism of formation of corrugations on the surface of electroslag ingots N75-10221
Investigating the quality of welded electroslag joints of rotors 1500 MM in diameter of 25[KHN3MF] steel of electroslag and electrofurnace smelting N75-10222
Using EShP to obtain cast electroslag forging billets N75-10223
Classification and bases of mathematical description of metallurgical processes of refining liquid metal N75-10224
Soviet bloc research in geophysics, astronomy, and space, no. 334
[JPRS-63186] N75-10518
Economy in design operations
[JPRS-63034] N75-10856
Status and prospects of development of space geodesy
[JPRS-63231] N75-10869

K

KAMAN AEROSPACE CORP., BLOOMFIELD, CONN.
Elastic pitch beam tail rotor operational suitability investigation
[AD-784595] N75-10069
KANNER [LEO] ASSOCIATES, REDWOOD CITY, CALIF.
Critical analyses and laboratory research work at the stage of aircraft preliminary design
[NASA-TT-F-15996] N75-10055
Interference of a sweptback wing and the fuselage at transonic speeds
[NASA-TT-F-15993] N75-10056
Performance improvement through control configured vehicle concept
[NASA-TT-F-15998] N75-10059
The CCV concept and specifications
[NASA-TT-F-15997] N75-10060
Quantitative determination of benzo/a/pyrene in tar-containing drugs by an isotope dilution method
[NASA-TT-F-15983] N75-10194
Effect of composition on stress corrosion cracking of austenitic stainless steels in several concentrations of boiling MgCl2 solutions
[NASA-TT-F-15995] N75-10207
Carbon-fiber-reinforced polymers and their thermal decomposition to carbon-carbon composities
[NASA-TT-F-15990] N75-10252
Experimental determination of the pressure recovery coefficients in conical diffusors at large subsonic velocities under various inlet conditions
[NASA-TT-F-15991] N75-10354
Rivers of the past: Creators of oil
[NASA-TT-F-15974] N75-10517
Water elution of organic matter in the northern Taiga forests of the Kola Peninsula
[NASA-TT-F-15981] N75-10519
Transformation of organic substances in soil
[NASA-TT-F-15985] N75-10521
Geochemical activity of soil microorganisms as an integral part of biogeocenosis
[NASA-TT-F-15976] N75-10565
The economics of using wind power for electricity supply in the Netherlands and for water supply on Curacao
[NASA-TT-F-15982] N75-10587
Problems of space biology. Volume 27: Radiobiology and genetics of arabidopsis
[NASA-TT-F-15849] N75-10679
Man in space orbit
[NASA-TT-F-15973] N75-10688
Acoustical studies of sound-producing sands
[NASA-TT-F-15715] N75-10752
KANSAS UNIV. CENTER FOR RESEARCH, INC., LAWRENCE.
The 8-18 GHz radar spectrometer
[NASA-CR-140317] N75-10411
S-193 scatterometer transfer function analysis for data processing
[NASA-CR-140314] N75-10569
KENT STATE UNIV., OHIO.
Optical and Faraday studies of liquid crystals N75-10825
KENTUCKY UNIV., LEXINGTON.
Mechanical behavior of polycrystalline ceramics: Brittle fracture of SiC-Si3N4 materials
[NASA-CR-134732] N75-10251
Radiation damage in metal-semiconductor tunnel junctions N75-10826
KYOTO UNIV. [JAPAN].
A study of CO2 gasdynamic lasers. Part 1: Theoretical and numerical analysis
[CP-38] N75-10435

L

LECLER [MICHEL], INC., HARVEY, LA.
Report on Project Hydrox 2
[AD-784446] N75-10701
LEHIGH UNIV., BETHLEHEM, PA.
Analytical modeling of defects in solids N75-10824
LIBRARY OF CONGRESS, WASHINGTON, D.C.
Astronautics and aeronautics, 1972
[NASA-SP-4017] N75-10129
National Environmental Policy Act of 1969. Environmental indices, status of development pursuant to Sections 102[2][B] and 204 of the act
[GPO-25-314] N75-10617
LINCOLN LAB., MASS. INST. OF TECH., LEXINGTON.
Frequency choice for tactical satellite communications
[AD-783912] N75-10298
LINGUISTIC SYSTEMS, INC., CAMBRIDGE, MASS.
Motion sickness
[NASA-TT-F-15864] N75-10685
Infrared filters
[NASA-TT-F-814] N75-10744
LITTLE [ARTHUR D.], INC., CAMBRIDGE, MASS.
Impact of motor gasoline lead additive regulations on petroleum refineries and energy resources, 1974-1980, phase 1
[PB-234185/7] N75-10601
LOCKHEED ELECTRONICS CO., HOUSTON, TEX.
Frequency standard stability for Doppler measurements on-board the shuttle
[NASA-TM-X-72030] N75-10156
JSC earth resources data analysis capabilities available to EOD revision B
[NASA-TM-X-72029] N75-10570
A communication link between the GIM data base and a general application program
[NASA-CR-140304] N75-10721
LOCKHEED MISSILES AND SPACE CO., HUNTSVILLE, ALA.
Physical forces influencing Skylab experiments M551, M552, and M553
[NASA-CR-129037] N75-10117
Convection effects on Skylab experiments M551, M552, and M553, phase C report
[NASA-CR-120482] N75-10120
Analysis of chemical lasers. Volume 1: Laser and mixing program lamp theory and user's guide
[AD-784531] N75-10449
Analysis of chemical lasers. Volume 2: Chemical laser flow analyses
[AD-784532] N75-10450

Analysis of chemical lasers. Volume 3: One dimensional laser and mixing program guide
[AD-784533] N75-10451
Analysis of chemical lasers. Volume 4: Method of characteristics laser and mixing program [MOC-LAMP] theory and user's guide
[AD-784534] N75-10452
LOCKHEED MISSILES AND SPACE CO., PALO ALTO, CALIF.
SPAR reference manual
[NASA-CR-120504] N75-10495
Coordinated rocket and satellite observations of the solar corona
[NASA-CR-140581] N75-10892
LOCKHEED MISSILES AND SPACE CO., SUNNYVALE, CALIF.
SPAR demonstration problems
[NASA-CR-120505] N75-10496
LOCKHEED-GEORGIA CO., MARIETTA.
Ground effect for V/STOL aircraft configurations and its simulation in the wind tunnel. Part 3: The tangentially blown ground as an alternative to a moving ground: Application to the NASA-Ames 40 by 80-foot wind tunnel
[NASA-CR-114497] N75-10005
LORD KINEMATICS, ERIE, PA.
Endurance testing of an LM-726-4 elastomeric pitch change bearing
[AD-784140] N75-10074
LOS ALAMOS SCIENTIFIC LAB., N.MEX.
Soft apertures for reducing damage in high power laser amplifier systems
[LA-5496-MS] N75-10439
Set theoretic approach to data type extension
[LA-UR-73-1287] N75-10726
Alternating-direction Galerkin methods for parabolic and hyperbolic problems on rectangular polygons
[LA-5534-MS] N75-10731
LOUGHBOROUGH UNIV. OF TECHNOLOGY [ENGLAND].
Propagation of waves in elliptic ducts. A theoretical study
[NASA-CR-140652] N75-10378
Sound turbulence interaction
[TT-7404] N75-10754
A survey of aircraft noise annoyance in an area of invariant noise to eliminate the effects on annoyance of varying noise exposure
[TT-7405] N75-10755
High speed cascade noise
[TT-7406] N75-10756

M

MALLORY [P. R.] AND CO., INC., BURLINGTON, MASS.
Sealed primary lithium-inorganic electrolyte cell
[AD-782819] N75-10607
MARCONI CO., LTD., CHELMSFORD [ENGLAND].
Traveling wave tube linearliser
[ESRO-CR[P]-489] N75-10323
MARCONI SPACE AND DEFENCE SYSTEMS LTD., CAMBERLEY [ENGLAND].
Study of the attitude and orbital control propulsion subsystem for the IME-D project
[T[F]S/033] N75-10175
MARTIN MARIETTA AEROSPACE, ORLANDO, FLA.
Dual S and Ku-band tracking feed for a TDRS reflector antenna
[NASA-CR-139122] N75-10312
MARTIN MARIETTA LABS., BALTIMORE, MD.
Further observations on the effect of grain boundary segregation in the hydrogen embrittlement of nickel
[AD-783103] N75-10248
MARYLAND UNIV., COLLEGE PARK.
Quadratic differential systems: A study in nonlinear systems theory
N75-10739
The application of coding to improve the yield and reliability of semiconductor memories
N75-10821
Conduction electrons and magnetism
[AD-783401] N75-10839
Models of massive molecular clouds
[AD-780922/1] N75-10885
MASHINSTOYENIYE, MOSCOW [USSR].
Tabulated values of combinations of cyclic and hyperbolic functions
N75-10052
Dynamic and static balancing gyroscopic equipment
N75-10401
MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Optimization of waterjet propulsion systems for surface effect ships
[AD-781916] N75-10464
Transport processes and trace constituents in the stratosphere
[COO-2249-3] N75-10523
Research-study of a self-organizing computer
[NASA-CR-140599] N75-10715
Algorithms and logical networks
[AD-783426] N75-10727
MASSACHUSETTS UNIV., AMHERST.
Experimental determination of hydrodynamic mass effects
[AD-781910] N75-10389
MATHEMATICAL APPLICATIONS GROUP, INC., ELMSFORD, N.Y.
An extension of the combinatorial geometry technique for modeling vegetation and terrain features
[AD-782883] N75-10577
MAX-PLANCK-INSTITUT FUER PHYSIK UND ASTROPHYSIK, MUNICH [WEST GERMANY].
Proposal for an experiment for the ESRO geostationary magnetospheric satellite
N75-10144
The electronics of the plasma drift experiment S 329 in the GEOS satellite
[MPI-PAE/TB-EXTRATERR-10] N75-10320
Calculation of NO and CO molecular spectra in the coma of a comet
[MPI-PAE/EXTRATERR-98] N75-10880
Nuclear composition of solar cosmic rays
[MPI-PAE/EXTRATERR-101] N75-10896
MAX-PLANCK-INSTITUT FUER PLASMAPHYSIK, GARCHING [WEST GERMANY].
One-dimensional equations for MHD channel flows
N75-10365
MCDONNELL-DOUGLAS ASTRONAUTICS CO., ST. LOUIS, MO.
Development of a wideband pulse quaternary modulation system
[NASA-CR-139129] N75-10288
MCDONNELL-DOUGLAS CORP., ST. LOUIS, MO.
High acceleration cockpits for advanced fighter aircraft Volume 1: Program summary
[AD-783600] N75-10064
High acceleration cockpits for advanced fighter aircraft. Volume 2: Crew station design/integration
[AD-783601] N75-10065
High acceleration cockpits for advanced fighter aircraft. Volume 3: Test plan
[AD-783602] N75-10066
High acceleration cockpits for advanced fighter aircraft. Volume 4: Test results
[AD-783603] N75-10067
Performance and exit distortion of diffusers as determined by force measurements
N75-10361
Generation of velocity profiles using screens of nonuniform solidity
N75-10362
MEDICAL BIOLOGICAL LAB. RVO-TNO, RIJSWIJK [NETHERLANDS].
Oral and respiratory immunization
[MBL-1974-4] N75-10698
MIAMI UNIV., CORAL GABLES, FLA.
Application of remote sensing for prediction and detection of thermal pollution
[NASA-CR-139182] N75-10572
MICHIGAN STATE UNIV., EAST LANSING.
An analysis of the spectral distribution of light quasi-elastically scattered from high molecular weight polymer solutions in the lower critical temperature region
N75-10250
Dispersion and instability characteristics of solid-state carrier waves in microwave integrated systems
N75-10827
MICHIGAN UNIV., ANN ARBOR.
Evaluation of coal conversion processes to provide clean fuels, part 1
[PB-234202/0] N75-10600
Evaluation of coal conversion processes to provide clean fuels, part 2
[PB-234203/8] N75-10604
Conversion of an ion-acoustic wave by collisions to a neutral sound wave in a nonhomogeneous plasma
[AD-782099] N75-10758
MINISTRY OF DEFENCE, LONDON [ENGLAND].
The impact of opto-electronics upon avionics
N75-10775
MOSCOW STATE UNIV. [USSR].
Physical practicum on electromagnetic fields
N75-10743
MOUND LAB., MIAMISBURG, OHIO.
Advanced heat source concepts
[MLM-2134] N75-10591

N

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Some factors affecting the use of lighter than air systems
[NASA-TM-X-62374] N75-10004
Optimal control theory investigation of proprotor/wing response to vertical gust
[NASA-TM-X-62384] N75-10057
Techniques for improving the stability of soft in-plane hingeless rotors
[NASA-TM-X-62390] N75-10058
Interplanetary space-A new laboratory for rarefied gas dynamics
[NASA-TM-X-72050] N75-10125
Pioneer odyssey: Encounter with a giant
[NASA-SP-349] N75-10130
Investigation of rank 2 and higher output feedback for pole placement
[NASA-TM-X-62385] N75-10741
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. FLIGHT RESEARCH CENTER, EDWARDS, CALIF.
Experimental determination of airplane mass and inertial characteristics
[NASA-TR-R-433] N75-10062
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
Relation between metric and decametric noise storm sources and microwave S-component emissions
[NASA-TM-X-70764] N75-10285
OAO 2/Wisconsin Experiment Package [WEP] photometer users guide
[NASA-TM-X-72533] N75-10410
Station coordinates for GEOS-C altimeter calibration and experimentation
[NASA-TM-X-70762] N75-10413
Third Earth Resources Technology Satellite Symposium. Volume 2: Summary of results
[NASA-SP-356] N75-10549
Water resources
N75-10559
Mineral resources, geological structures, and landform surveys
N75-10561
Geodetic results from ISAGEX data
[NASA-TM-X-70763] N75-10567
The evolution of electron density and temperature distributions in the topside ionosphere during magnetic storms
[NASA-TM-X-70768] N75-10621
The variation of solar proton energy spectra size distribution with heliolongitude
[NASA-TM-X-70770] N75-10899
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FLA.
Station set requirements document. Volume 82: Fire support. Book 2: Preliminary functional fire plan
[NASA-TM-X-72032] N75-10105
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, LANGLEY STATION, VA.
Extraction from flight data of lateral aerodynamic coefficients for F-8 aircraft with supercritical wing
[NASA-TN-D-7749] N75-10006
Wind tunnel tests of modified cross, hemisflo, and disk-gap-band parachutes with emphasis in the transonic range
[NASA-TN-D-7759] N75-10007
A parametric study of effect of forebody shape on flow angularity at Mach 8
[NASA-TN-D-7768] N75-10008
An exploratory flight investigation of helicopter sling-load placements using a closed-circuit television as a pilot aid
[NASA-TN-D-7776] N75-10009
Simulation studies of STOL airplane operations in metropolitan downtown and airport air traffic control environments
[NASA-TN-D-7740] N75-10038
Analysis of a flare-director concept for an externally blown flap STOL aircraft
[NASA-TN-D-7760] N75-10061
Flight tests of Viking parachute system in three Mach number regimes. I: Vehicle description, test operations, and performance
[NASA-TN-D-7692] N75-10147
Analytical chemical kinetic investigation of the effects of oxygen, hydrogen, and hydroxyl radicals on hydrogen-air combustion
[NASA-TN-D-7769] N75-10195
In situ mass analysis of particles by surface ionization mass spectrometry
[NASA-TM-X-3112] N75-10196
An inlet analysis for the NASA hypersonic research engine aerothermodynamic integration model
[NASA-TM-X-3038] N75-10348
A simple method of calculating power-law velocity profile exponents from experimental data
[NASA-TM-X-72000] N75-10356
A computing method for sound propagation through a nonuniform jet stream
[NASA-TM-X-71941] N75-10359
An improved static pressure probe
[NASA-CASE-LAR-11552-1] N75-10412
WINDOWAC [Wing Design Optimization With Aeroelastic Constraints]: Program manual
[NASA-TM-X-3071] N75-10484
A computer program for plotting stress-strain data from compression, tension, and torsion tests of materials
[NASA-TM-X-3091] N75-10485
Minimum-weight designs for hat-stiffened composite panels under uniaxial compression
[NASA-TN-D-7779] N75-10497
The spin-temperature theory of dynamic nuclear polarization and nuclear spin-lattice relaxation
[NASA-TR-R-427] N75-10765

Some aspects of optical feedback with cadmium sulfide and related photoconductors
[NASA-TN-D-7727] N75-10785
A technique for displaying flight information in the field of view of binoculars for use by the pilots of radio controlled models
[NASA-TM-X-72015] N75-10786
Ion heating in a plasma focus
[NASA-TN-D-7765] N75-10798
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
Real-time simulation of the TF30-P-3 turbofan engine using a hybrid computer
[NASA-TM-X-3106] N75-10095
Liquid rocket engine turbopump gears
[NASA-SP-8100] N75-10166
Centaur feedline dynamics study using power spectral methods
[NASA-TM-X-3111] N75-10171
Fabrication of liquid-rocket thrust chambers by electroforming
[NASA-TM-X-3116] N75-10172
An overview of high temperature metal fatigue: Aspects covered by the 1973 International Conference on Creep and Fatigue
N75-10489
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.
Technology evaluation of heating, ventilation, and air conditioning for MIUS application
[NASA-TM-X-58128] N75-10135
Performance monitor system functional simulator, environmental data, orbiter 101[HFT]
[NASA-TM-X-72028] N75-10136
Frequency standard stability for Doppler measurements on-board the shuttle
[NASA-TM-X-72030] N75-10156
Agriculture, forestry, range resources
N75-10558
JSC earth resources data analysis capabilities available to EOD revision B
[NASA-TM-X-72029] N75-10570
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
MSFC Skylab corollary experiment systems mission evaluation
[NASA-TM-X-64820] N75-10121
Retention and application of Skylab experiences to future programs
[NASA-TM-X-64853] N75-10126
MSFC Skylab mission report: Saturn workshop
[NASA-TM-X-64814] N75-10138
Saturn 1B launch vehicle flight evaluation report SA-208 [Skylab-4]
[NASA-TM-X-72019] N75-10140
SSME/side loads analysis for flight configuration, revision A
[NASA-TM-X-64841] N75-10164
Apparatus for measuring the ferrite content of austenitic stainless steel weld material
[NASA-CASE-MFS-22907-1] N75-10210
Testing of a flat conductor cable baseboard system for residential and commercial wiring
[NASA-TM-X-64888] N75-10313
An improved heat exchanger
[NASA-CASE-MFS-22991-1] N75-10366
Translatory shock absorbers for attitude sensors
[NASA-CASE-MFS-22905-1] N75-10407
Carbon monoxide monitor
[NASA-CASE-MFS-22060-1] N75-10414
An improved portable peening gun
[NASA-CASE-MFS-23047-1] N75-10459
Solar energy absorber
[NASA-CASE-MFS-22743-1] N75-10585
Solar energy trap
[NASA-CASE-MFS-22744-1] N75-10586
The 1974 NASA-ASEE summer faculty fellowship aeronautics and space research program
[NASA-CR-120336] N75-10745
Magnetogasdynamic compression of a coaxial plasma accelerator flow for micrometeoroid simulation
[NASA-TR-R-435] N75-10799
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MISSISSIPPI TEST FACILITY, BAY SAINT LOUIS.
Land use and mapping
N75-10560
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.
Zero torque gear head wrench
[NASA-CASE-NPO-13059-1] N75-10456
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
Aeronautical Engineering: A special bibliography with indexes, supplement 47
[NASA-SP-7037[47]] N75-10001
Aeronautical Engineering: A special bibliography with indexes, supplement 48
[NASA-SP-7037[48]] N75-10002
Pioneer 11 Jupiter encounter
[NASA-NEWS-RELEASE-74-292] N75-10123
Skynet 2-b/Delta 105
[NASA-NEWS-RELEASE-74-303] N75-10124
INTELSAT 4
[NASA-NEWS-RELEASE-74-305] N75-10131
Spacelab program requirements, level I
[NASA-TM-X-72031] N75-10137
Mission operation report: Applications Technology Satellite [ATS-F]
[NASA-TM-X-72530] N75-10141
Aerospace medicine and biology: A continuing bibliography with indexes, supplement 132
[NASA-SP-7011[132]] N75-10684
NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.
Preliminary hydrogen freezing studies
[NASA-CR-140605] N75-10266
Development of insulation transfer-standards using a flat plate calorimeter
[NASA-CR-140710] N75-10403
Calculated liquid phase thermodynamic properties and liquid-vapor equilibria for fluorine-oxygen [FLOX] mixtures
[NASA-CR-140709] N75-10844
NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.
Chemical kinetics data survey. 5. Sixty-six contributed rate and photochemical data evaluations on ninety-four reactions
[NBSIR-73-206] N75-10180
Transition metal oxides: Crystal chemistry, phase transition and related aspects
[NSRDS-NBS-49] N75-10193
Thermodynamics of chemical species important to rocket technology
[AD-782028] N75-10238
Fire detection: The state-of-the-art
[NASA-CR-140653] N75-10404
NATIONAL CENTRE OF TRIBOLOGY, RISLEY [ENGLAND].
Thermal vacuum qualification test of No. 1 Hawker Siddeley Dynamics low speed mechanism
[ESRO-ESTL-3] N75-10461
Activities of the European Space Tribology Laboratory
[ESRO-ESTL-5] N75-10462
NATIONAL GAS TURBINE ESTABLISHMENT, PYESTOCK [ENGLAND].
The effect of cycle parameters on high temperature low cycle fatigue
N75-10491
NATIONAL MATERIALS ADVISORY BOARD, WASHINGTON, D.C.
A semi-delphi exercise on fluorspar and manganese in steelmaking
[NMAB-317] N75-10273
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, MIAMI, FLA.
Remote sensing of ocean current boundary layer
[E74-10801] N75-10529
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ROCKVILLE, MD.
Skylab a proposal aerotriangulation with very small scale photography
[E74-10804] N75-10532
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D.C.
A review of initial investigations to utilize ERTS-1 data in determining the availability and distribution of living marine resources
N75-10555
Coastal upwelling ecosystems analysis. Data report 13: Radiation measurements off the Oregon coast July/August 1973
[PB-233958/8] N75-10676
NATIONAL PHYSICAL LAB., TEDDINGTON [ENGLAND].
Two FORTRAN contouring routines
[NPL-NAC-47] N75-10724
NATIONAL RESEARCH COUNCIL, BANGKOK [THAILAND].
Thailand national programme of the Earth Resources Technology Satellite
[E74-10806] N75-10533
The Thailand programme of the Earth Resources Technology Satellite
[E74-10807] N75-10534
NATIONAL RESEARCH COUNCIL, WASHINGTON, D.C.
A review of the toxicology research program of the 6570th Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio
[AD-782249] N75-10703
NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA [ONTARIO].
Some icing tests on selected screen samples
[LR-ENG-17] N75-10090
Experience with the NRC 10 feet by 20 feet V/STOL propulsion tunnel: Some practical aspects of V/STOL engine model testing
[DME/NAE-1973[2]] N75-10107
NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D.C.
The attainable goal in airline safety
N75-10035
Annual review of aircraft accident data: US General Aviation calendar year 1971
[NTSB-ARG-74-2] N75-10037
NAVAL ACADEMY, ANNAPOLIS, MD.
Optimum rate of climb for high performance aircraft
[AD-784112] N75-10076
NAVAL AMMUNITION DEPOT, CRANE, IND.
Evaluation of the thermal characteristics of the AN/WQC-2 final amplifier
[AD-783953] N75-10326
Evaluation program for secondary spacecraft cells: Initial evaluation tests of General Electric Company 12.0 ampere-hour, nickel-cadmium spacecraft cells for the international ultraviolet Explorer satellite
[NASA-CR-140672] N75-10583
Atmospheric properties and their effect on target acquisition under flare illumination
[AD-783052] N75-10665
NAVAL ORDNANCE LAB., WHITE OAK, MD.
A study of the effect of pressure gradient on the eddy viscosity and mixing length for incompressible equilibrium turbulent boundary layers
[AD-783942] N75-10392
Analytical procedures used to obtain and evaluate the eddy viscosity and mixing length extracted from incompressible turbulent boundary layer data
[AD-784416] N75-10397
NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
Two dimensional analysis of fluid-structure interaction by method of finite differences: hydraulic ram, the fuel tank problem
[AD-783839] N75-10068
Laboratory development and tensile testing of graphite/glass/epoxy hybrid composite materials
[AD-783860] N75-10190
High temperature texture strengthening in alpha-titanium
[AD-784213] N75-10240
Digital display of characteristic parameters of active radio frequency transmission systems
[AD-783806] N75-10302
A rational basis for circumferential distortion index formulation
[AD-783819] N75-10394
Real time holographic interferometry
[AD-784215] N75-10432
Application of satellite cloud brightness data for large scale tropical analysis: A correlation study of brightness and 200-MB divergence
[AD-784366] N75-10652
Recent advances in numerical weather prediction
[AD-784364] N75-10664
An experiment to measure the modulation transfer function of the atmosphere in the marine boundary layer
[AD-783807] N75-10792
Natural convection flow visualization and heat transfer from a horizontal circular disk
[AD-783793] N75-10845
Simulation of redshifts in hydrogen by perturbations
[AD-783776] N75-10881
NAVAL RESEARCH LAB., WASHINGTON, D.C.
The J-code: A minimum peak distortion code
[AD-783949] N75-10296
A prototype four-horn cluster IFF antenna
[AD-784395] N75-10327
Proceedings of the Waldorf Conference on Long Range Geographic Estimation of Lightning Sources
[AD-784393] N75-10624
Magnetic variations caused by wind waves
[AD-783944] N75-10626
Geologic and geomagnetic background noise in two areas of the North Atlantic, phase I
[AD-783693] N75-10627
NRL progress report, January 1974
[PB-233882/0] N75-10748
NRL progress report, February 1974
[PB-233883/8] N75-10749
Interim report on Fokker-Planck studies of two-component-tori
[AD-783036] N75-10816
NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, ANNAPOLIS, MD.
The effects of welding and various postweld treatments on the low-cycle fatigue behavior of 5086-H116 and 5456-H117 aluminum alloys
[AD-784392] N75-10509
NAVY DEPT., WASHINGTON, D.C.
Proceeding of the Colloquium on Technology Transfer
[AD-782723] N75-10852
NEW HAMPSHIRE UNIV., DURHAM.
Data analysis support for UNH gamma ray detector on OSO-7
[NASA-CR-140597] N75-10139
NEW MEXICO STATE UNIV., UNIVERSITY PARK.
Stripline flush mount antenna array
[AD-783334] N75-10335
Jemez atmospheric water resources research project, Volume 1: Summary and accomplishments
[PB-234005/7] N75-10657
Jemez atmospheric water resources research project. Volume 2: Special aspects of the program
[PB-234006/5] N75-10658

NEW MEXICO UNIV., ALBUQUERQUE.
Thermal oxidation of gallium arsenide phosphide
N75-10179

NEW YORK STATE MUSEUM AND SCIENCE SERVICE, ALBANY.
Assessment of ERTS-1 imagery as a tool for regional geological analysis in New York State
[E74-10809] N75-10536

NEW YORK UNIV., N.Y.
Fluid dynamic aspects of jet noise generation
[NASA-CR-140673] N75-10088
Helium at zero temperature with hard-sphere and other forces
[COO-3077-35] N75-10182

NEWCASTLE-UPON-TYNE UNIV. [ENGLAND].
Precision in LCHTF testing
N75-10490

NORTH CAROLINA STATE UNIV., RALEIGH.
Development of high temperature materials for solid propellant rocket nozzle applications
[NASA-CR-140666] N75-10165

NORTH CENTRAL FOREST EXPERIMENT STATION, ST. PAUL, MINN.
Mean precipitation-hours for the conterminous United States
[NC-98] N75-10629
Tables and conversions for microclimatology
[PB-234158/4] N75-10655

NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
Reliable results from stochastic simulation models
[USDA-NE-277] N75-10735

NORTHERN PRAIRIE WILDLIFE RESEARCH CENTER, JAMESTOWN, N. DAK.
Utilization of Skylab [EREP] system for appraising changes in continental migratory bird habitat
[E74-10817] N75-10543

NORTHWESTERN TECHNOLOGICAL INST., EVANSTON, ILL.
Research on varied properties of metals, ceramics, polymers, and alloys
[AD-783964] N75-10185

NUCLEONIC DATA SYSTEMS, INC., IRVINE, CALIF.
A nucleonic oil debris monitor for detecting metal in recirculating lubricating systems
[AD-784137] N75-10428

O

OAK RIDGE NATIONAL LAB., TENN.
Total energy use for commercial aviation in the US
[ORNL-NSF-EP-68] N75-10039
NSF-Rann energy abstracts: A monthly abstract journal of energy research
[ORNL-EIS-74-52-VOL-2-NO-1] N75-10592

OFFICE OF NAVAL RESEARCH, LONDON [ENGLAND].
EUROMECH 46: Numerical and experimental investigations of the stability of boundary layers
[AD-783568] N75-10391

OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING, WASHINGTON, D.C.
T and E guidelines for aircraft systems
[AD-784549] N75-10085
T and E guidelines for command and control systems
[AD-784550] N75-10301
T and E guidelines for airborne ECM systems
[AD-784574] N75-10332

OHIO STATE UNIV., COLUMBUS.
Development of accelerated life testing techniques for general failure modes of aircraft hardware
[AD-784188] N75-10073
The interaction between line force arrays and planar cracks
[AD-783704] N75-10244
Target identification by means of low frequency radar returns
[AD-783224] N75-10293
Information processing for target-detection and identification
[AD-783229] N75-10304
Automated strip mine and reclamation mapping from ERTS
N75-10556

OKLAHOMA UNIV., NORMAN.
Correlation of thermodynamic properties of fluids through generalized hard sphere-augmented equation of state
N75-10843

OPTICAL INDUSTRIES N. V., DELFT [NETHERLANDS].
Optics for passive viewing devices
N75-10781

OREGON STATE UNIV., CORVALLIS.
Design of a mini-computer controlled digital integrated circuit tester
N75-10402
The Coho Project: Living resources prediction feasibility study, volume 1
[PB-234057/8] N75-10681
The Coho Project: Living resources prediction feasibility study. Volume 2: Environmental report
[PB-234058/6] N75-10682
The Coho Project: Living resources prediction feasibility study. Volume 3: System evaluation report
[PB-234059/4] N75-10683
Outpatient medical costs related to air pollution in the Portland, Oregon area
[EPA-600/5-74-017] N75-10692

OWENS VALLEY RADIO OBSERVATORY, PASADENA, CALIF.
Radio recombination line observation of the CII region NGC2023
[AD-783983] N75-10883
Models of massive molecular clouds
[AD-780922/1] N75-10885

P

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
The effect of ausworking on the strength of type 420 stainless steel with the addition of carbide-forming elements
N75-10206
Diffusion studies in nonmetallic system, part 1
[AD-784437] N75-10246
The entropic energy of geophysical fluid systems
N75-10343
The prediction of turbulent confined jet mixing with and without swirl
N75-10345
The influence of self-focusing on the stimulated line of the Rayleigh wing
N75-10771
Turbulent magnetic fields in a collision dominated plasma
[PSU-IRL-SCI-432] N75-10800
Theoretical investigation of stellar atmospheres with specific application to the atmosphere of a carbon star R coronae borealis
N75-10871

PERKIN-ELMER CORP., NORWALK, CONN.
Molecular beam epitaxy of 2-4 compound waveguides
[AD-784650] N75-10837

PHYSICS LAB. RVO-TNO, THE HAGUE [NETHERLANDS].
A detection system with two photomultiplier units for measurement of projectile terminal velocity
[PHL-1974-22] N75-10421
Pattern recognition relevant to reconnaissance and remote sensing
[PHL-1974-23] N75-10573

PITTSBURGH UNIV., PA.
Free and forced vibration of rectangular plate with damping and arbitrary boundary conditions
N75-10481
Three suggested methods of controlling air pollution in the US and their probable economic impact on the domestic coal industry
N75-10614

PLESSEY RADAR LTD., HAVANT [ENGLAND].
Optical waveguide data transmission for avionics
N75-10779

POLYTECHNIC INST. OF BROOKLYN, N.Y.
Analysis of a shallow spherical shell containing an asymmetrically located ring stiffened circular hole subjected to an arbitrarily located concentrated load
[AD-783351] N75-10511
Studies of pollutant concentration frequency distributions
N75-10613
Quasi-optical methods for waveguides and resonators
N75-10768
Scattering of optical beams from slowly varying leaky wave structures
N75-10769
A study of beam couplers for integrated optics
[AD-784514] N75-10793

PRATT AND WHITNEY AIRCRAFT, MIDDLETOWN, CONN.
Design procedures for elevated temperature low-cycle fatigue
N75-10494

PRATT AND WHITNEY AIRCRAFT, WEST PALM BEACH, FLA.
Shrouded impeller test program
[AD-784133] N75-10100

PRINCETON UNIV. OBSERVATORY, N.J.
Application of digital computer techniques to rectification and enhancement of astronomical images
[NASA-CR-140701] N75-10878

PRINCETON UNIV., N.J.
Vibration and stability of structures with high electric currents
N75-10309
On the non-existence of adjacent equilibrium states at bifurcation points
[AD-783336] N75-10510
Physical mechanism of parametric instabilities near the lower hybrid frequency in inhomogeneous plasma
[MATT-1069] N75-10801
Radiation from plasmas in the ST Tokamak
[MATT-1077] N75-10802
Transport and divertor studies in the FM-1 spherator
[MATT-1078] N75-10803
The effects of impurities and magnetic divertors on high-temperature tokamaks
[MATT-1079] N75-10804
Two-energy component toroidal fusion devices
[MATT-1088] N75-10805

PURDUE UNIV., LAFAYETTE, IND.
Novel materials for power systems. Part 1: Schizophrenic catalysts
[AD-784447] N75-10203
Novel materials for power systems. Part 2: Investigations of proton semi-conducting glasses
[AD-784448] N75-10257
Intermittency, the entrainment problem
N75-10342
Summary of the Laser Raman Workshop on the measurement of gas properties
[AD-782562] N75-10390
Analytical and experimental research on HF chemical lasers
[AD-784590] N75-10444
Analytical investigation of the effects of rotational relaxation in a C. W., HF chemical laser
[AD-784589] N75-10448
An interdisciplinary analysis of multispectral satellite data for selected cover types in the Colorado Mountains, using automatic data processing techniques
[E74-10803] N75-10531
Novel materials for power systems. Part 3: Selective emitters for energy conversion
[AD-784449] N75-10608
An air pollution control system
N75-10615

Q

QUEEN MARY COLL., LONDON [ENGLAND].
A two-dimensional aerofoil oscillating at low frequencies in high subsonic flow
[ARC-CP-1285] N75-10027

R

RADIO CORP. OF AMERICA, LANCASTER, PA.
GaAs Large Optical Cavity [LOC] laser diode for communications receivers
[AD-784341] N75-10442

RADIO CORP. OF AMERICA, PRINCETON, N.J.
The 3-5 surface studies
[AD-784206] N75-10840
The III-V surface studies
[AD-784342] N75-10842

RAND CORP., SANTA MONICA, CALIF.
On calculating radioactive fluxes and temperature changes in atmospheres off arbitrary structure
[AD-784442] N75-10639
User's guide to auxiliary programs for the Mintz-Arakawa atmospheric model
[AD-784443] N75-10660

RCA SERVICE CO., INC., SPRINGFIELD, VA.
In-harbor and at-sea electromagnetic compatibility survey for maritime satellite L-band shipboard terminal
[NASA-CR-139131] N75-10284
EMC test plan for shipboard in-harbor and at-sea measurements for L-band terminal
[NASA-CR-139130] N75-10286

RENSSELAER POLYTECHNIC INST., TROY, N.Y.
Multiaxial fatigue. Present and future methods of correlation
N75-10492
High altitude pulmonary edema
[AD-782240] N75-10702

RESEARCH INST. OF NATIONAL DEFENCE, STOCKHOLM [SWEDEN].
The geometrical accuracy of electrical wires and the interference effects on small measuring objects
[FOA-2-C-2539-D4] N75-10415

RESEARCH TRIANGLE INST., DURHAM, N.C.
Comparability of nine methods for monitoring NO2 in ambient air
[PB-233429/0] N75-10618

RESEARCH TRIANGLE INST., RESEARCH TRIANGLE PARK, N.C.
Implementation of an experimental program to investigate the performance characteristics of OMEGA navigation
[NASA-CR-132516] N75-10041

RHODE ISLAND UNIV., KINGSTON.
Laser Raman spectroscopy of solutes dissolved in water from a remote platform
[PB-233432/4] N75-10202
RICE UNIV., HOUSTON, TEX.
Unified approach to quadratically convergent algorithms for constrained function minimization
N75-10729
Gallium arsenide submillimeter photoconductive detection
N75-10820
Fluctuation effects in the superconducting transition of rhenium
N75-10823
ROCHESTER UNIV., N.Y.
Gradient index optics: Aspects of design, testing, tolerancing, and fabrication
N75-10770
Network models of crystals
[AD-784516] N75-10835
Outer layers of white dwarf stars
N75-10870
ROCKETDYNE, CANOGA PARK, CALIF.
Space shuttle orbit maneuvering engine reusable thrust chamber program
[NASA-CR-140321] N75-10167
ROCKWELL INTERNATIONAL CORP., ANAHEIM, CALIF.
Fungus and corrosion induced failure mechanisms
[AD-783361] N75-10479
ROCKWELL INTERNATIONAL CORP., DOWNEY, CALIF.
Aerodynamic results of support system interference effects tests conducted in NASA/ARC 6 by 6-foot supersonic wind tunnel using an 0.015-scale model of the configuration 140A/B SSV orbiter [OA59], volume I
[NASA-CR-134410] N75-10108
ROME UNIV. [ITALY].
Profile and contamination of an electron beam
[NOTA-INTERNA-542] N75-10766
Multicharged particle emission in the disintegration of carbon induced by high-energy electrons
[NOTA-INTERNA-555] N75-10767
ROYAL AIRCRAFT ESTABLISHMENT, BEDFORD [ENGLAND].
A calculation method for the turbulent boundary layer on an infinite yawed wing in compressible, adiabatic flow
[ARC-CP-1268] N75-10024
The external drag of fuselage side intakes: Rectangular intakes with compression surfaces vertical
[ARC-CP-1269] N75-10025
ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH [ENGLAND].
The nature, development and effect of the viscous flow around an aerofoil with high-lift devices
[ARC-CP-1258] N75-10021
The design of a series of warped slender wings for subsonic speeds
[ARC-CP-1263] N75-10022
A calculation method for the two dimensional turbulent flow over a slotted flap
[ARC-CP-1267] N75-10023
Some calculations for air resonance of a helicopter with non-articulated rotor blades
[ARC-R/M-3743] N75-10029
Low-speed wing-tunnel measurements of the lift, drag and pitching moment of a series of cropped delta wings
[ARC-R/M-3744] N75-10030
Automatic flying of curved approach paths: A computer and flight investigation
[RAE-TR-73154] N75-10043
Hybrid electrohydraulic stick-force simulator
[RAE-LIB-TRANS-1751] N75-10110
Satellite X4: The 100-element self-scanned photodiode array experiment
[RAE-TR-73195] N75-10145
On power conditioning for satellite stabilisation thrusters
[RAE-LIB-TRANS-1771] N75-10158
Directionally solidified Co-Cr-C composites. Microstructure and strength between 20 C and 1050 C obtained by different solidification modes
[RAE-LIB-TRANS-1764] N75-10187
Fatigue endurance, crack sensitivity and nucleation characteristics of structural elements in four aluminium-copper alloys
[ARC-CP-1259] N75-10503
Further work on the integration of closed loops specified only as discrete data points
[RAE-TR-73177] N75-10723
Low light television systems
N75-10783
Cabtrack: Communications and control instrumentation for a one-fifth scale test track
[RAE-TR-73169] N75-10867
ROYAL INST. OF TECH., STOCKHOLM [SWEDEN].
On changes of variables in kinetic theory
[TRITA-EPP-74-11] N75-10806
Trends in nuclear fusion research
[TRITA-EPP-74-12] N75-10807
ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT.
Does representative ground wind measurement exist?
[KNMI-V-257] N75-10640
ROYAL RADAR ESTABLISHMENT, MALVERN [ENGLAND].
Laser sources
N75-10776

S

SAAB-SCANIA, LINKOPING [SWEDEN].
Application of the polar coordinate method to oscillating wing configurations
[SAAB-TN-69] N75-10010
SALFORD UNIV. [ENGLAND].
A shock capturing method for calculating supersonic flow fields
[ARC-CP-1290] N75-10381
SANDIA CORP., ALBUQUERQUE, N.MEX.
Heat transfer in high temperature opacified fiber insulation
[SLA-73-5677] N75-10189
Hydrogen in metals: A new theoretical model
[SLA-73-5810] N75-10233
Methodology for computation of interface parameters of a hot-wire explosive device from the electrothermal response analog
[SLA-73-1034] N75-10261
Evaluation of pre-bond etchants in hybrid microcircuit processing
[SLA-73-1049] N75-10316
Effect of soldering flux on Ta2N resistors
[SLA-73-1045] N75-10317
Modern trends in environmental testing
[SLA-73-5931] N75-10469
Technique for testing the tensile strength of thermocompression bonds
[SLA-74-93] N75-10470
Accelerated lifetesting of thin film tungsten contacts for a milliwatt Si-Ge thermopile
[SLA-73-1087] N75-10471
Response of a finite cylindrical shell to a cosine impulse over half its circumference
[SLA-73-5827] N75-10499
Results of thermal battery cell testing
[SLA-74-5002] N75-10589
Long-life, low-voltage, power thermal battery
[SLA-73-7069] N75-10590
In-situ transport measurements on UHV grown a-Ge samples
[SLA-73-7074] N75-10834
SANDIA LABS., ALBUQUERQUE, N.MEX.
Quantitative analysis of the influence of contaminants on thermocompression bonding of gold
[SLA-73-1099] N75-10228
Aircraft-velocity measurement through radar-altimeter echo with noncoherent detection
[SLA-74-112] N75-10290
Large aperture electrooptic photographic shutter
[SLA-74-101] N75-10416
Real time digital control of remote tracking instruments
[SLA-74-5186] N75-10418
Image enhancement techniques: Electron microprobe experiment
[SLL-73-292] N75-10787
Surface electronic properties and the search for new hydrogen oxidation catalysts
[SLA-73-5805] N75-10833
Rocket operations plan. Australian eclipse June 1974
[SLA-74-117] N75-10895
SANDIA LABS., LIVERMORE, CALIF.
Photo-optical instrumentation of flyer plate tests
[SLL-72-105] N75-10417
SCHOOL OF AEROSPACE MEDICINE, BROOKS AFB, TEX.
Physiologic testing of the T-43 passenger oxygen mask
[AD-783237] N75-10711
SCIENCE APPLICATIONS, INC., ALBUQUERQUE, N. MEX.
Holographic interferometry developments for dense plasmas
[AD-783511] N75-10813
SCIENTIFIC TRANSLATION SERVICE, SANTA BARBARA, CALIF.
Operational effectiveness of transport aircraft
[NASA-TT-F-810] N75-10036
The effect of the titanium content on the active corrosion of ferritic r-steels and austenitic Cr-Ni-steels in sulfuric acid
[NASA-TT-F-15994] N75-10211
Remarks about the influence of density fluctuations in turbulent boundary layers for compressible flow
[NASA-TT-F-15989] N75-10353
One method of numerical solution of the Navier-Stokes equations for a compressible gas
[NASA-TT-F-15992] N75-10355
Certain systematic errors arising in the photometry of planetary discs
[NASA-TT-F-15999] N75-10405
Turbulence studies on a high-altitude sounding aircraft
[NASA-TT-F-16003] N75-10622
Finite-amplitude waves in a stratified jet stream and clear air turbulence
[NASA-TT-F-16002] N75-10628
The problem of human statokinetic stability in aviation and space medicine
[NASA-TT-F-15933] N75-10687
The dependence of reaction times on the location of the stimulus
[NASA-TT-F-16001] N75-10689
International space law
[NASA-TT-F-15912] N75-10865
Astrometry and astrophysics
[NASA-TT-F-15767] N75-10884
Earth - Space - Moon
[NASA-TT-F-800] N75-10886
Orbital geology
[NASA-TT-F-16000] N75-10887
SERVICE TECHNIQUE DES TELECOMMUNICATIONS DE L'AIR, PARIS [FRANCE].
Principle and realization of aeronautical laser systems
N75-10782
SERVICES ELECTRONICS RESEARCH LAB., BALDOCK [ENGLAND].
Infrared and visible radiation detectors for imaging and non-imaging applications
N75-10777
SHEFFIELD UNIV. [ENGLAND].
Topological properties of charge algebras
[RR-143/MBR/KPSBR-5] N75-10734
SIEMENS A.G., MUNICH [WEST GERMANY].
Piezoelectric traveling wave amplifiers
[BMFT-FB-T-74-05] N75-10318
Functioning of power rectifiers and thyristors from 1 January 1970 to 31 December 1972
[BMFT-FB-T-74-07] N75-10319
Problems in producing highest energy densities by organic capacitor dielectrics
[BMFT-FB-T-74-10] N75-10321
Coherent optical filtering methods in the object and space frequency domain [experiments, theory and critical considerations for application in the fields of character reading and pattern recognition]
[BMFT-FB-T-74-08] N75-10728
Electron energy loss spectrometry
[BMFT-FB-T-74-06] N75-10788
SMITHS INDUSTRIES LTD., BISHOPS CLEEVE [ENGLAND].
Head-up display optics
N75-10780
SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASS.
Optical transfer function of NTS-1 retroreflector array
[NASA-CR-140667] N75-10773
Physical and dynamical studies of meteors
[NASA-CR-132534] N75-10891
SOCIETE NATIONALE D'ETUDE ET DE CONSTRUCTION DE MOTEURS D'AVIATION, CORBEIL [FRANCE].
Problems of low cycle high temperature fatigue in aircraft jet engines
N75-10488
SOCIETE NATIONALE INDUSTRIELLE AEROSPATIALE, PARIS [FRANCE].
Design and development of a momentum wheel with a mainly passive magnetic bearing. Volume 1: Design report, phase I
[ESRO-CR[P]-505-VOL-1] N75-10161
SOLAR, SAN DIEGO, CALIF.
Tungsten-reinforced oxidation-resistant columbium alloys
[AD-783985] N75-10192
SOUTHAMPTON UNIV. [ENGLAND].
Parametric investigation of a linear edge colloid thruster
[ESRO-CR[P]-485] N75-10174
SOVIET RADIO, MOSCOW [USSR].
Theoretical principles of statistical radiotechnology, book 1
N75-10276
Transistorized impulse generators in the millisecond range
N75-10306
STANFORD RESEARCH INST., MENLO PARK, CALIF.
Diode beacon techniques
[AD-783619] N75-10045
Reliability of laboratory tests of VSTOL and other long duration noises
[NASA-CR-2471] N75-10093
Effective utilization of solar energy to produce clean fuel
[PB-233956/2] N75-10605

STANFORD UNIV., CALIF.
Shock-tube studies of vibrational equilibration in carbon dioxide by simultaneous laser absorption and infrared-emission measurements
N75-10346
Integrated pneumatic transporter-incinerator-afterburner subsystem development
[NASA-CR-140686] N75-10457
Structure dependence of high temperature deformation of metals
[SU-326-P-17-X-5] N75-10498
Ultrasonic absorption by phospholipid vesicles; acoustic impedance matching and the design of broadband piezoelectric transducers
N75-10751
Low-frequency instabilities and plasma turbulence
N75-10797
Termination of the solar wind in the hot, partially ionized interstellar medium
[NASA-CR-140699] N75-10893
Dynamics of the solar wind and its interaction with bodies in the solar system
[NASA-CR-140702] N75-10894

STATE UNIV. OF NEW YORK, BUFFALO.
Susceptibility of UHF RF transistors to high power UHF signals
[AD-780536/9] N75-10297
Hydraulic model study of surface and subsurface wind-driven currents in Lake Ontario
N75-10515

STATE UNIV. OF NEW YORK, GENESCO.
A comparison of lyman alpha and He lambda 10830 line structures and variations in early-type star atmospheres
[NASA-CR-140572] N75-10876

STD RESEARCH CORP., PASADENA, CALIF.
Two-dimensional flow inside MHD ducts with transverse asymmetries
N75-10364

SUN OIL CO., MARCUS HOOK, PA.
Study to define behavior of liquid lubricants in an elastohydrodynamic contact
[NASA-CR-134671] N75-10455

SYSTEMS RESEARCH LAB., CHAMPAIGN, ILL.
Modern sampled-data control theory: Design of the Large Space Telescope
[NASA-CR-2457] N75-10875

SYSTEMS SCIENCE AND SOFTWARE, LA JOLLA, CALIF.
Laser-interaction studies. Part 1: A theoretical investigation of laser supported combustion waves. Part 2: Measurements of the effect of particulate, matter on air breakdown by 1.06 micron
[AD-784356] N75-10436

T

TECHNISCH PHYSISCH DIENST TNO-TH, DELFT [NETHERLANDS].
Experiment S-59 conversion
[REPT-311.271] N75-10134

TECHTRAN CORP., GLEN BURNIE, MD.
Comparative measurements behind a compressor rotor with a space-bound and corotating cylindrical probes
[NASA-TT-F-15833] N75-10352
Alterations of color sensation under hypoxic conditions
[NASA-TT-F-15879] N75-10686

TELEDYNE BROWN ENGINEERING, HUNTSVILLE, ALA.
Liquid phase sintered compacts in space
[NASA-CR-120507] N75-10122

TENNESSEE UNIV., KNOXVILLE.
Geographic applications of ERTS-1 imagery to landscape change
[E74-10810] N75-10537
ERTS-1 imagery interpretation techniques in the Tennessee Valley
[E74-10811] N75-10538

TEXAS A&M UNIV., COLLEGE STATION.
The hydrodynamic impact of a falling body upon a viscous incompressible fluid
N75-10341
A study of a dual polarization laser backscatter system for remote identification and measurement of water pollution
[NASA-CR-140665] N75-10563

TEXAS INSTRUMENTS, INC., DALLAS.
A conceptaul definition study for a digital avionics information system [approach 2], volume 1
[AD-780581/5] N75-10071
A conceptual definition study for a digital avionics information system [approach 2]. Volume 2: Appendixes A thru D
[AD-780582/3] N75-10072
Production engineering measure for an Integrated Power Switch [IPS]
[AD-784317] N75-10329
ND-doped mixed crystal laser material research
[AD-783842] N75-10445

TEXAS UNIV., AUSTIN.
A microwave model of the instrument landing system
[PB-232747/6] N75-10113
NTC tracking display
[AD-783961] N75-10760

TEXAS UNIV., HOUSTON.
Probability of illness definition for the Skylab flight crew health stabilization program
[NASA-CR-140300] N75-10691

TOKYO UNIV. [JAPAN].
On the operating characteristics of induction motors fed by thyristor inverters
[SERIAL-150-VOL-24-NO-1] N75-10310
Overall study on mechanics of leveling and straightening
[SERIAL-149-VOL-23-NO-6] N75-10483

TORONTO UNIV. [ONTARIO].
Analysis and design of a fixed-wheel attitude stabilization system for a stationary satellite
[UTIAS-188] N75-10149

TRANSPORT AND ROAD RESEARCH LAB., CROWTHORNE [ENGLAND].
An analysis of some world transport statistics
[PB-232940/7] N75-10868

TRW SYSTEMS GROUP, REDONDO BEACH, CALIF.
Modeling and analysis of power processing systems: Feasibility investigation and formulation of a methodology
[NASA-CR-134686] N75-10150
Precision Pointing Control System [PPCS] system design and analysis
[NASA-CR-139132] N75-10157
An optical instrument for in-situ stress measurement in rocks
[AD-783301] N75-10429
Holographic study of rock specimens under uniaxial and triaxial loads
[AD-784433] N75-10431
H2-Cl2 chemical laser program. Part 3: Additional arc jet laser experiments
[AD-782871] N75-10446
Underwater applications of acousto-optical imaging
[AD-784419] N75-10759

TRW, INC., PHILADELPHIA, PA.
Production engineering measure for thin film ratiometer
[AD-782236] N75-10423

TYCO LABS., INC., WALTHAM, MASS.
Continuous silicon solar cells
[PB-233949/7] N75-10602

U

UNILEVER RESEARCH, VLAARDINGEN [NETHERLANDS].
The influence of surfactants on the adhesion between solids
N75-10254
Measurement of platelet aggregation in flowing blood with the use of a filter
N75-10699

UNITED AIRCRAFT CORP., EAST HARTFORD, CONN.
E-beam HCl laser
[AD-784500] N75-10447

UNITED AIRCRAFT CORP., STRATFORD, CONN.
Investigation of the effects of blade structural design parameters on helicopter stall boundaries
[AD-784594] N75-10075

UNIVERSITY CORP. FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.
Atmospheric and climatological research progress
N75-10632

UNIVERSITY OF SOUTHERN CALIF., LOS ANGELES.
Research in solid state, plasmas, electrical and biomedical engineering
[AD-784655] N75-10750

V

VALVO G.M.B.H., HAMBURG [WEST GERMANY].
FM laboratory measurements on the 12GHz klystron YK 1210 [V42SK]
[ESRO-CR[P]-523] N75-10324

VANDERBILT UNIV., NASHVILLE, TENN.
The unit Reynolds number effect on boundary layer transition
N75-10340

VIRGINIA INST. OF MARINE SCIENCE, GLOUCESTER POINT.
Remote sensing applications in marine science programs at VIMS
[NASA-CR-137475] N75-10566

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG.
Contamination effects in a laminar proportional amplifier
[AD-782244] N75-10396

An experimental investigation of unsymmetric crack tip deformation fields in materials with nonuniform properties
[AD-784136] N75-10504

VIRGINIA UNIV., CHARLOTTESVILLE.
Contribution of a wall shear stress to the Magnus effect on nose shapes
[AD-784145] N75-10400
Models of subjective response to in-flight motion data
[NASA-CR-140675] N75-10708

W

WASHINGTON STATE UNIV., PULLMAN.
Picosecond flash photolysis and spectroscopy: Bis-[4-dimethylaminodithiobenzil]--Ni[2], [BDN]
[AD-781925] N75-10199

WASHINGTON UNIV., SEATTLE.
Coastal upwelling ecosystems analysis. Data report 13: Radiation measurements off the Oregon coast July/August 1973
[PB-233958/8] N75-10676

WASHINGTON UNIV., ST. LOUIS, MO.
An investigation of electro-optical modulation methods in GaSs epitaxial thin film waveguides at 10.6 micron wavelength
N75-10817
The composition of cosmic rays with Z greater than or equal to 12
N75-10897

WESTINGHOUSE ASTRONUCLEAR LAB., PITTSBURGH, PA.
Interdiffusion behavior of tungsten or rhenium and group 5 and 6 elements and alloys of the periodic table. Part 2A: Appendices A-G
[NASA-CR-134526] N75-10209

WESTINGHOUSE DEFENSE AND ELECTRONIC SYSTEMS CENTER, BALTIMORE, MD.
Study of the use of Charge-Coupled Devices [CCDs] in analog signal processing systems
[AD-783703] N75-10300

WESTINGHOUSE RESEARCH LABS., PITTSBURGH, PA.
Effect of selected impurities on the high temperature mechanical properties of hot-pressed silicon nitride
[AD-783506] N75-10255

WHITE SANDS MISSILE RANGE, N.MEX.
Real-time cinetheodolite data system [RTCDS] for Yuma Proving Ground
[AD-781969] N75-10426
Physical constants and conversion factors
[AD-782701] N75-10733

WISCONSIN UNIV., MADISON.
Applications of the direct photon absorption technique for measuring bone mineral content in vivo. Determination of body composition in vivo
[NASA-CR-140708] N75-10694
Skeletal status and soft tissue composition in astronauts. Tissue and fluid changes by radionuclide absorptiometry in vivo
[NASA-CR-140689] N75-10695
Skeletal status and soft tissue composition in astronauts. Tissue and fluid changes by radionuclide absorptiometry in vivo
[NASA-CR-140703] N75-10696
Module level diagnosis of combinational networks
N75-10740

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Cruise data report. CHAIN 115 leg 2, Southlant expedition
[AD-784421] N75-10641

WORCESTER POLYTECHNIC INST., MASS.
Production of edible carbohydrates from formaldehyde in a spacecraft. pH variations in the calcium hydroxide catalyzed formose reaction
[NASA-CR-140684] N75-10181

WORLD METEOROLOGICAL ORGANIZATION, GENEVA [SWITZERLAND].
International operations plan for the GARP Atlantic Tropical Experiment, parts 1, 4, 6 and 7
[GATE-9-PT-1] N75-10633
General background and objectives and reference information on platform status, ship schedules and distribution
N75-10634
Satellite operations plan
N75-10635
Operations support plan
N75-10636
Data coordination plan for the GATE Operations Control Centre [GOCC]
N75-10637
Modelling for the first GARP global experiment
[GARP-PUBL-14] N75-10639
Report of the meeting on drifting buoys for the first GARP global experiment
[GARP-SPEC-REPT-13] N75-10674

WYLE LABS., INC., HAMPTON, VA.
NASA-Langley helicopter tower instrumentation systems
[NASA-CR-132522] N75-10106

X

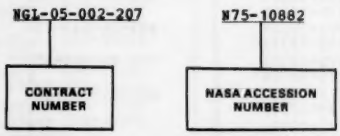
XEROX ELECTRO-OPTICAL SYSTEMS, PASADENA, CALIF.
Shuttle sortie electro-optical instruments study
[NASA-CR-132457] N75-10406

Y

YALE UNIV., NEW HAVEN, CONN.
Accuracy of homogeneous nucleation rates determined in supersonic nozzles
[AD-784506] N75-10388

CONTRACT NUMBER INDEX

Typical Contract Number Index Listing



Listings in this index are arranged alphanumerically by contract number. Under each contract number, the NASA accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order. The NASA accession number denotes the number by which the citation is identified.

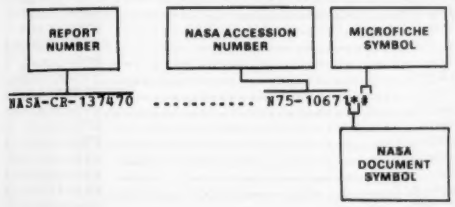
ACC PROJ. 405-74
N75-10305
AF PROJ. 317J
N75-10395
AF PROJ. 1369
N75-10078
AF PROJ. 1710-69
N75-10293
AF PROJ. 3006
N75-10098
AF PROJ. 3059
N75-10176
AF PROJ. 3145
N75-10610
AF PROJ. 4506
N75-10609
AF PROJ. 5556
N75-10045
AF PROJ. 5970
N75-10032
AF PROJ. 6190
N75-10064
N75-10065
N75-10066
N75-10067
AF PROJ. 7164
N75-10711
AF PROJ. 7231
N75-10709
N75-10757
AF PROJ. 7351
N75-10249
AF PROJ. 7659
N75-10335
AF PROJ. 7904
N75-10048
N75-10424
AF PROJ. 7905
N75-10184
AF PROJ. 8809
N75-10814
AF PROJ. 9750
N75-10238
AF PROJ. 9752
N75-10812
AF PROJ. 9769
N75-10304
AF PROJ. 9778
N75-10112
N75-10115
AF PROJ. 9782
N75-10510
N75-10758
AF PROJ. 9783
N75-10815
AF-AFOSR-0001-73
N75-10238
AF-AFOSR-1710-69
N75-10293
N75-10304
AF-AFOSR-1858-70
N75-10812
AF-AFOSR-1989-71
N75-10815
AF-AFOSR-2180-72
N75-10272
AF-AFOSR-2224-72
N75-10758
AF-AFOSR-2685-74
N75-10272
ARO PROJ. VF233
N75-10399
ARPA ORDER 1468
N75-10431
ARPA ORDER 1622-4
N75-10675
ARPA ORDER 1649
N75-10265
ARPA ORDER 1801
N75-10178
ARPA ORDER 2169
N75-10507
ARPA ORDER 2269
N75-10429
ARPA ORDER 2327
N75-10837
ARPA ORDER 2338
N75-10203
N75-10257
N75-10608
ARPA ORDER 2614
N75-10453
AT(04-3)-34 N75-10232
AT(04-3)-326 N75-10498
AT(11-1)-1422
N75-10694
N75-10695
N75-10696
AT(11-1)-2249
N75-10523
AT(11-1)-3073
N75-10801
N75-10802
N75-10803
N75-10804
N75-10805
AT(11-1)-3077
N75-10182
AT(11-1)-3151
N75-10832
AT(11-1)-3166
N75-10231
AT(11-1)-3284
N75-10373
AT(29-1)-613 N75-10188
N75-10269
N75-10270
N75-10314
N75-10315
N75-10437
N75-10438
N75-10460
N75-10830
AT(29-1)-789 N75-10228
N75-10261
N75-10290
N75-10316
N75-10317
N75-10416
N75-10417
N75-10470
N75-10471
N75-10895
AT(39-1)-613 N75-10268
AT-33-1-GEN-53
N75-10591
AT/2037/0102 N75-10382
AT/2037/0141 N75-10382
A72/KM/143 N75-10044
DA PROJ. 1F1-62203-A-119
N75-10073
DA PROJ. 1F1-62205-A-119
N75-10080
DA PROJ. 1F1-62208-AA-82
N75-10075
DA PROJ. 1F1-63204-DB-38
N75-10074
DA PROJ. 1F1-63205-DB-38
N75-10081
DA PROJ. 1F2-62203-AH-86
N75-10069
N75-10428
DA PROJ. 1G1-62207-AA-71
N75-10100
DA PROJ. 1G6-62708-D-05
N75-10577
DA PROJ. 1S7-62705-AH-94
N75-10612
DA PROJ. 1T0-61101-A-91A
N75-10848
DA PROJ. 1T0-61102-B-11A
N75-10841
DA PROJ. 1T1-61101-A-91A
N75-10046
DA PROJ. 1T1-61102-A-33-B
N75-10396
DA PROJ. 1T1-61102-A-33D
N75-10400
DA PROJ. 1T3-62301-A-201
N75-10116
DA PROJ. 1T5-62609-A-308
N75-10450
N75-10451
N75-10452
DA PROJ. 1T6-62609-A-308
N75-10444
N75-10448
DA PROJ. 1T6-62703-43
N75-10449
DA PROJ. 1T6-65702-D-127
N75-10644
N75-10645
N75-10646
N75-10647
N75-10648
N75-10649
N75-10650
N75-10651
DA PROJ. 1U6-65072-D-623
N75-10426
DA PROJ. 1W1-62113-A-660
N75-10191
DA PROJ. 200-61102-B-31F
N75-10272
DA PROJ. 7X2-63304-D-215
N75-10331
DA PROJ. 67372512-K-2101
N75-10079
DA-ARO(D)-31-124-G947
N75-10838
DA-ARO(D)-31-124-G1148
N75-10236
DA-ARO(D)-31-124-70-G12
N75-10838
DA-ARO(D)-31-124-71-G36
N75-10838
DA-ARO(D)-31-124-71-G114
N75-10839
DA-ARO(D)-31-124-71-G144
N75-10247
DA-ARO(D)-31-124-74-G173
N75-10247
DAAB05-73-C-2063
N75-10329
DAAB05-73-C-2077
N75-10423
DAAB07-69-C-0383
N75-10272
DAAB07-72-C-0046
N75-10331
DAAB07-73-C-0062
N75-10442
DAAB07-74-C-0020
N75-10479
DAAB07-74-C-0108
N75-10612
DAAB07-74-C-0109
N75-10607
DAAD05-72-C-0131
N75-10400
DAAD05-73-C-0537
N75-10577
DAAD09-74-C-0006
N75-10666
N75-10667
DAAF07-69-C-0444
N75-10504
DAAG39-73-C-0175
N75-10396
DAAH01-73-C-0167
N75-10444
N75-10448
DAAH01-73-C-0446
N75-10446
DAAH01-74-C-0173
N75-10449
N75-10450
N75-10451
N75-10452
DAAH01-74-C-0386
N75-10436
DAAH01-74-C-0434
N75-10264
DAAH01-74-C-0437
N75-10453
DAAJ01-71-C-0840
N75-10063
N75-10082
N75-10097
DAAJ02-71-C-0063
N75-10069
DAAJ02-71-D-0001
N75-10080
DAAJ02-72-C-0091
N75-10074
DAAJ02-72-C-0105
N75-10075
DAAJ02-72-C-0107
N75-10428
DAAJ02-72-C-0111
N75-10083
DAAJ02-72-C-0114
N75-10081
DAAJ02-73-C-0023
N75-10073
DAAJ02-74-C-0001
N75-10100
DAAK02-72-C-0197
N75-10295
DAAK02-74-C-0081
N75-10840
N75-10842
DAC15-73-G-0007
N75-10507
DADA17-72-C-2121
N75-10702
DAHC04-71-C-0039
N75-10727
DAHC15-72-G-0010
N75-10507
DAHC15-73-C-0181
N75-10659
N75-10660
DAHC15-73-G-0011
N75-10203
N75-10257
N75-10608
DI-14-01-0001-498
N75-10603
DI-14-01-0001-3011
N75-10656
DI-14-06-D-6803
N75-10657
N75-10658

DI-14-31-0001-3641 N75-10202
DNA001-71-C-0100 N75-10431
DNA001-73-C-0041 N75-10813
DOT-CG-23671-B N75-10049 N75-10050 N75-10051
DOT-CG-34017-A N75-10563
DOT-TSC-565 N75-10291
EPA-68-01-0423 N75-10692
EPA-68-02-0335 N75-10618
EPA-68-02-1332 N75-10601
ESRO-SC/20/73-HQ N75-10134
ESRO-SC/23-HQ N75-10476 N75-10477
ESRO-1884/73-PP N75-10175
ESTEC-609/68 N75-10472 N75-10473 N75-10474 N75-10475 N75-10478
ESTEC-902/70 N75-10717
ESTEC-1185/70-HP N75-10596
ESTEC-1513/71-IS N75-10324
ESTEC-1773/72-HD N75-10323
ESTEC-1779/72-AA N75-10174
ESTEC-1832/72-AA N75-10160
ESTEC-2038/73-PP N75-10161
FTD PROJ. T74-01-12 N75-10077
FTD PROJ. T74-05-14 N75-10177
F04695-67-C-0197 N75-10791 N75-10794 N75-10795
F04701-71-C-0327 N75-10719
F19628-72-C-0065 N75-10335
F19628-73-C-0002 N75-10298
F30602-72-C-0401 N75-10609
F30602-72-C-0415 N75-10297
F30602-72-C-0444 N75-10045
F30602-73-C-0313 N75-10265
F33615-71-C-1456 N75-10610
F33615-71-C-1805 N75-10239
F33615-72-C-1977 N75-10445
F33615-73-C-1156 N75-10071 N75-10072
F33615-73-C-2036 N75-10098
F33615-73-C-3067 N75-10064 N75-10065 N75-10066 N75-10067
F33615-73-C-5053 N75-10506
F33657-73-C-0470 N75-10032
F44620-70-C-0105 N75-10112 N75-10115
F44620-71-C-0067 N75-10750
F44620-72-C-0053 N75-10524 N75-10675
F44620-73-C-0015 N75-10429
F44620-74-C-0037 N75-10510
F44620-74-C-0047 N75-10511
GS-00-DS-(P)-94008 N75-10273
INK-07-12615 N75-10019
MIN-DEF/PE-AT/2037/0102 N75-10377
MIN-TEC-KC-49/25/CB/5/D N75-10026
NAS-2481 N75-10060
NASA ORDER C-32369-C N75-10844
NASA ORDER H-79204-A N75-10403
NASA ORDER R-09-040-001 N75-10562
NASA ORDER S-23404-G N75-10583
NASA ORDER S-70243-AG N75-10528 N75-10539
NASA ORDER S-70243-AG-2 N75-10541
NASA ORDER S-70243-AG-7 N75-10540
NASA ORDER T-4110-B N75-10532
NASA ORDER T-4114-B N75-10543
NASA ORDER T-4713-B N75-10529
NASW-2276 N75-10715
NASW-2481 N75-10055 N75-10056 N75-10059 N75-10194 N75-10207 N75-10252 N75-10354 N75-10517 N75-10519 N75-10565 N75-10587 N75-10679 N75-10688 N75-10752
NASW-2482 N75-10685 N75-10744
NASW-2483 N75-10036 N75-10211 N75-10353 N75-10355 N75-10405 N75-10622 N75-10628 N75-10687 N75-10689 N75-10865 N75-10884 N75-10886 N75-10887
NASW-2485 N75-10352 N75-10686
NASW-2487 N75-10521
NASW-2589 N75-10892
NAS1-11204 N75-10891
NAS1-11537 N75-10104
NAS1-11602 N75-10093
NAS1-12043 N75-10041
NAS1-12209 N75-10542
NAS1-12277 N75-10155
NAS1-12710 N75-10406
NAS1-12841 N75-10106
NAS2-5603 N75-10888
NAS2-6475 N75-10054
NAS2-6690 N75-10005
NAS2-7048 N75-10358
NAS3-13231 N75-10209
NAS3-14304 N75-10089
NAS3-14321 N75-10351
NAS3-15342 N75-10458
NAS3-15850 N75-10163
NAS3-16788 N75-10092
NAS3-17593 N75-10455
NAS3-17782 N75-10150
NAS3-17842 N75-10091
NAS3-17853 N75-10094
NAS5-20045 N75-10851
NAS5-20406 N75-10281 N75-10282 N75-10287
NAS5-20415 N75-10312
NAS5-21111 N75-10157
NAS5-21680 N75-10746
NAS5-21726 N75-10537
NAS5-21749 N75-10545
NAS5-21764 N75-10536
NAS5-21808 N75-10546 N75-10547 N75-10548 N75-10568
NAS5-21812 N75-10544
NAS5-21875 N75-10538
NAS5-21959 N75-10853
NAS5-22148 N75-10289
NAS5-23156 N75-10347
NAS5-23248 N75-10288
NAS5-24035 N75-10284 N75-10286
NAS6-1902 N75-10566
NAS6-2006 N75-10671 N75-10673
NAS6-2307 N75-10143
NAS6-2433 N75-10571
NAS7-100 N75-10142 N75-10168 N75-10169 N75-10456 N75-10678 N75-10707 N75-10712 N75-10730 N75-10890
NAS8-20899 N75-10468
NAS8-26352 N75-10495 N75-10496
NAS8-27015 N75-10117 N75-10120
NAS8-27996 N75-10772
NAS8-28725 N75-10118
NAS8-28728 N75-10119
NAS8-29286 N75-10736
NAS8-29853 N75-10875
NAS8-29875 N75-10225
NAS8-29951 N75-10122
NAS8-30373 N75-10311
NAS9-8242 N75-10042
NAS9-10261 N75-10411
NAS9-11528 N75-10128
NAS9-12200 N75-10156 N75-10570 N75-10721
NAS9-12783 N75-10691
NAS9-12802 N75-10167
NAS9-12967 N75-10283
NAS9-13247 N75-10108 N75-10109 N75-10148 N75-10151 N75-10152 N75-10153 N75-10154 N75-10170 N75-10360
NAS9-13280 N75-10527
NAS9-13303 N75-10535
NAS9-13347 N75-10569
NAS9-13364 N75-10526
NAS9-13380 N75-10531
NAS9-13394 N75-10530
NAS9-13446 N75-10409
NAS9-13864 N75-10101 N75-10102
NAS9-13939 N75-10127
NAS10-8498 N75-10572
NGL-04-001-007 N75-10357
NGL-05-002-134 N75-10879
NGL-05-002-207 N75-10882
NGL-05-007-L90 N75-10889
NGL-18-001-042 N75-10251
NGL-44-001-001 N75-10563
NGR-05-003-402 N75-10877
NGR-05-003-470 N75-10690
NGR-05-009-257 N75-10693
NGR-05-020-330 N75-10125 N75-10893 N75-10894
NGR-05-020-706 N75-10457
NGR-09-015-002 N75-10773
NGR-10-015-008 N75-10670
NGR-10-019-009 N75-10616
NGR-22-017-023 N75-10181
NGR-22-017-024 N75-10181
NGR-30-002-104 N75-10139
NGR-31-001-142 N75-10878
NGR-33-008-191 N75-10272
NGR-33-010-082 N75-10722
NGR-33-013-086 N75-10672
NGR-33-016-177 N75-10088
NGR-33-219-002 N75-10876
NGR-34-002-108 N75-10165
NGR-36-004-055 N75-10087
NGR-44-005-206 N75-10086
NGR-47-005-181 N75-10708
NGR-50-002-051 N75-10694 N75-10695 N75-10696
NGR-50-002-183 N75-10695 N75-10696
NGT-01-003-044 N75-10584
NGT-01-003-045 N75-10745
NOAA-043-022-28 N75-10681 N75-10682 N75-10683
NR PROJ. 009-007 N75-10793
NR PROJ. 032-525 N75-10246
NR PROJ. 032-541 N75-10256
NR PROJ. 032-545 N75-10258
NR PROJ. 036-087 N75-10248
NR PROJ. 051-524 N75-10199
NR PROJ. 083-004 N75-10641
NR PROJ. 098-038 N75-10390
NR PROJ. 200-016 N75-10389
NR PROJ. 211-149 N75-10661
NR PROJ. 215-214 N75-10162

NR PROJ. 240-030 N75-10759
NRL PROJ. G03-01 N75-10627
NRL PROJ. HC0-65 N75-10816
NRL PROJ. 83G03-01 N75-10626
NSF AG-299 N75-10676
NSF AG-398 N75-10039
NSF C-727 N75-10364
NSF GA-3761 N75-10893
NSF GA-33446X1 N75-10800
NSF GA-37691 N75-10125
NSF GB-33575 N75-10185
NSF GB-38503 N75-10272
NSF GI-34809X1 N75-10564
NSF GI-37067 N75-10602
NSF GI-38723 N75-10605
NSF GK-33800 N75-10398
NSF GP-23780 N75-10882
NSF GP-26218 N75-10885
NSF GP-30400 N75-10885
NSF GP-30400-X2 N75-10882
NSF GP-35545X N75-10882
NSF GX-33502 N75-10681 N75-10682 N75-10683
N00014-66-C-0241 N75-10641
N00014-67-A-0094 N75-10885
N00014-67-A-0094-0019 N75-10882 N75-10883
N00014-67-A-0097-0012 N75-10388
N00014-67-A-0204-0052 N75-10464
N00014-67-A-0226-0005 N75-10390
N00014-67-A-0244-0015 N75-10703
N00014-67-A-0377-0008 N75-10467
N00014-67-A-0385-0011 N75-10246
N00014-67-A-0438-0014 N75-10793
N00014-68-A-0146 N75-10389
N00014-68-A-0196-0009 N75-10888
N00014-68-A-0410-003 N75-10199
N00014-68-A-0493-0001 N75-10398
N00014-68-C-0323 N75-10255
N00014-70-C-0390 N75-10241 N75-10243 N75-10244
N00014-71-C-0308 N75-10835
N00014-71-C-0331 N75-10178
N00014-72-C-0175 N75-10661
N00014-72-C-0182 N75-10759
N00014-72-C-0450 N75-10447
N00014-73-C-0025 N75-10200
N00014-73-C-0213 N75-10162
N00014-73-C-0233 N75-10701
N00014-73-C-0243 N75-10443
N00014-73-C-0280 N75-10837
N00014-73-C-0408 N75-10256
N00014-74-C-0069 N75-10300
N00014-74-C-0241 N75-10258
N00014-74-C-0279 N75-10248
N00017-72-C-4401 N75-10047 N75-10653 N75-10718 N75-10747
N00017-72-G-4401 N75-10425
N60921-74-C-0217 N75-10760
N622969-69-C-0218 N75-10192
PROJ. 3032871 N75-10504
RR1310341 N75-10626 N75-10627
RTI PROJ. 430-818 N75-10041
SF43422703 N75-10509
SN/1170/012 N75-10755
SRC-B/RG/622 N75-10754
SRC-B/RG/0326 N75-10756
SRC-B/SR/7377 N75-10376
SRC-B/SR/8978 N75-10375
SRI PROJ. 1970 N75-10045
W-31-109-ENG-38 N75-10349 N75-10350 N75-10486
W-7405-ENG-26 N75-10039 N75-10592
W-7405-ENG-36 N75-10439 N75-10731
W-7405-ENG-38 N75-10732
W-7405-ENG-48 N75-10260 N75-10522 N75-10593 N75-10594 N75-10828
WU-50/16 N75-10379
ZR0000101 N75-10397
176-21-31-05 N75-10196
176-31-21-05 N75-10765
188-45-52-03 N75-10891
386-01-00-00-72 N75-10135
501-06-05 N75-10062
501-22-01-05 N75-10484
501-22-03-01 N75-10485
501-22-04-01 N75-10007
501-22-11-01 N75-10497
501-24 N75-10095 N75-10171
501-24-16-01 N75-10348
501-26-04-02 N75-10006
502-03-52-04 N75-10785
502-10-01-01 N75-10798
502-24 N75-10172
504-29-14-01 N75-10061
505-03-12-02 N75-10359
505-05-42-01 N75-10195
505-07-11 N75-10741
505-10-22 N75-10057
505-11-15-02 N75-10356
760-63-04-03 N75-10009
760-66-01-02 N75-10008 N75-10104
768-81-04-01 N75-10038
815-20-09-03 N75-10147

REPORT/ACCESSION NUMBER INDEX

Typical Report/Accession Number Index Listing



Listings in this index are arranged alphanumerically by report number. The NASA accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche. A plus sign (+) indicates a document that cannot be microfiched but for which one-to-one facsimile is available.

ACC-ACO-7-74 ..... N75-10305 #

AD-779473 ..... N75-10331 #
AD-780536/9 ..... N75-10297 #
AD-780581/5 ..... N75-10071 #
AD-780582/3 ..... N75-10072 #
AD-780922/1 ..... N75-10885 #
AD-781138/3 ..... N75-10524 #
AD-781340 ..... N75-10791 #
AD-781910 ..... N75-10389 #
AD-781916 ..... N75-10464 #
AD-781925 ..... N75-10199 #
AD-781969 ..... N75-10426 #
AD-782018 ..... N75-10675 #
AD-782028 ..... N75-10238 #
AD-782052 ..... N75-10810 #
AD-782060 ..... N75-10812 #
AD-782073 ..... N75-10197 #
AD-782078/0 ..... N75-10719 #
AD-782085 ..... N75-10811 #
AD-782099 ..... N75-10758 #
AD-782214 ..... N75-10295 #
AD-782226 ..... N75-10443 #
AD-782236 ..... N75-10423 #
AD-782240 ..... N75-10702 #
AD-782244 ..... N75-10396 #
AD-782249 ..... N75-10703 #
AD-782562 ..... N75-10390 #
AD-782701 ..... N75-10733 #
AD-782723 ..... N75-10852 #
AD-782819 ..... N75-10607 #
AD-782822 ..... N75-10642 #
AD-782871 ..... N75-10446 #
AD-782883 ..... N75-10577 #
AD-782908 ..... N75-10236 #
AD-783036 ..... N75-10816 #
AD-783047 ..... N75-10512 #
AD-783049 ..... N75-10454 #
AD-783052 ..... N75-10665 #
AD-783098 ..... N75-10162 #
AD-783103 ..... N75-10248 #
AD-783224 ..... N75-10293 #
AD-783229 ..... N75-10304 #
AD-783235 ..... N75-10249 #
AD-783237 ..... N75-10711 #
AD-783241 ..... N75-10611 #
AD-783250 ..... N75-10048 #
AD-783254 ..... N75-10399 #
AD-783256 ..... N75-10112 #
AD-783257 ..... N75-10115 #
AD-783261 ..... N75-10815 #
AD-783267 ..... N75-10610 #
AD-783268 ..... N75-10032 #
AD-783275 ..... N75-10265 #
AD-783301 ..... N75-10429 #
AD-783334 ..... N75-10335 #
AD-783336 ..... N75-10510 #
AD-783351 ..... N75-10511 #
AD-783353 ..... N75-10239 #
AD-783361 ..... N75-10479 #
AD-783401 ..... N75-10839 #
AD-783402 ..... N75-10247 #
AD-783426 ..... N75-10727 #
AD-783463 ..... N75-10114 #
AD-783468 ..... N75-10648 #
AD-783470 ..... N75-10649 #
AD-783471 ..... N75-10651 #
AD-783472 ..... N75-10647 #
AD-783473 ..... N75-10650 #
AD-783474 ..... N75-10646 #
AD-783475 ..... N75-10645 #
AD-783476 ..... N75-10644 #
AD-783477 ..... N75-10848 #
AD-783484 ..... N75-10790 #
AD-783506 ..... N75-10255 #
AD-783511 ..... N75-10813 #
AD-783561 ..... N75-10325 #
AD-783566 ..... N75-10465 #
AD-783567 ..... N75-10463 #
AD-783568 ..... N75-10391 #
AD-783570 ..... N75-10505 #
AD-783571 ..... N75-10393 #
AD-783600 ..... N75-10064 #
AD-783601 ..... N75-10065 #
AD-783602 ..... N75-10066 #
AD-783603 ..... N75-10067 #
AD-783614 ..... N75-10184 #
AD-783615 ..... N75-10424 #
AD-783616 ..... N75-10506 #
AD-783619 ..... N75-10045 #
AD-783662 ..... N75-10574 #
AD-783664 ..... N75-10643 #
AD-783679 ..... N75-10888*#
AD-783693 ..... N75-10627 #
AD-783703 ..... N75-10300 #
AD-783704 ..... N75-10244 #
AD-783724 ..... N75-10243 #
AD-783725 ..... N75-10241 #
AD-783732 ..... N75-10294 #
AD-783760 ..... N75-10796 #
AD-783761 ..... N75-10303 #
AD-783764 ..... N75-10598 #
AD-783765 ..... N75-10237 #
AD-783776 ..... N75-10881 #
AD-783779 ..... N75-10704 #
AD-783780 ..... N75-10814 #
AD-783793 ..... N75-10845 #
AD-783803 ..... N75-10709 #
AD-783805 ..... N75-10757 #
AD-783806 ..... N75-10302 #
AD-783807 ..... N75-10792 #
AD-783819 ..... N75-10394 #
AD-783820 ..... N75-10789 #
AD-783821 ..... N75-10836 #
AD-783823 ..... N75-10098*#
AD-783839 ..... N75-10068 #
AD-783842 ..... N75-10445 #
AD-783849 ..... N75-10176 #
AD-783860 ..... N75-10190 #
AD-783901 ..... N75-10609 #
AD-783912 ..... N75-10298 #
AD-783915 ..... N75-10272*#
AD-783917 ..... N75-10333 #
AD-783923 ..... N75-10466 #
AD-783927 ..... N75-10099 #
AD-783930 ..... N75-10334 #
AD-783942 ..... N75-10392 #
AD-783944 ..... N75-10626 #
AD-783949 ..... N75-10296 #
AD-783953 ..... N75-10326 #
AD-783961 ..... N75-10760 #
AD-783964 ..... N75-10185 #
AD-783965 ..... N75-10198 #
AD-783968 ..... N75-10299 #
AD-783969 ..... N75-10508 #
AD-783970 ..... N75-10427 #
AD-783971 ..... N75-10662 #

AD-783973 ..... N75-10422 #
AD-783977 ..... N75-10631 #
AD-783981 ..... N75-10183 #
AD-783983 ..... N75-10883 #
AD-783984 ..... N75-10661 #
AD-783985 ..... N75-10192 #
AD-784016 ..... N75-10177 #
AD-784072 ..... N75-10612 #
AD-784077 ..... N75-10116 #
AD-784096 ..... N75-10305 #
AD-784100 ..... N75-10668 #
AD-784101 ..... N75-10669 #
AD-784109 ..... N75-10079 #
AD-784112 ..... N75-10076 #
AD-784128 ..... N75-10700 #
AD-784130 ..... N75-10082 #
AD-784132 ..... N75-10063 #
AD-784133 ..... N75-10100 #
AD-784134 ..... N75-10083 #
AD-784136 ..... N75-10504 #
AD-784137 ..... N75-10428 #
AD-784140 ..... N75-10074 #
AD-784142 ..... N75-10705 #
AD-784145 ..... N75-10400 #
AD-784147 ..... N75-10430 #
AD-784172 ..... N75-10513 #
AD-784174 ..... N75-10663 #
AD-784175 ..... N75-10245 #
AD-784177 ..... N75-10080 #
AD-784188 ..... N75-10073 #
AD-784189 ..... N75-10081 #
AD-784206 ..... N75-10840 #
AD-784208 ..... N75-10606 #
AD-784209 ..... N75-10514 #
AD-784213 ..... N75-10240 #
AD-784215 ..... N75-10432 #
AD-784228 ..... N75-10795 #
AD-784229 ..... N75-10794 #
AD-784245 ..... N75-10654 #
AD-784254 ..... N75-10070 #
AD-784257 ..... N75-10078 #
AD-784259 ..... N75-10077 #
AD-784289 ..... N75-10710 #
AD-784297 ..... N75-10507 #
AD-784309 ..... N75-10841 #
AD-784312 ..... N75-10049 #
AD-784313 ..... N75-10050 #
AD-784314 ..... N75-10051 #
AD-784317 ..... N75-10329 #
AD-784321 ..... N75-10242 #
AD-784326 ..... N75-10453 #
AD-784332 ..... N75-10178 #
AD-784337 ..... N75-10433 #
AD-784341 ..... N75-10442 #
AD-784342 ..... N75-10842 #
AD-784350 ..... N75-10264 #
AD-784356 ..... N75-10436 #
AD-784364 ..... N75-10664 #
AD-784366 ..... N75-10652 #
AD-784372 ..... N75-10718 #
AD-784373 ..... N75-10425 #
AD-784374 ..... N75-10653 #
AD-784375 ..... N75-10047 #
AD-784378 ..... N75-10747 #
AD-784380 ..... N75-10291 #
AD-784392 ..... N75-10509 #
AD-784393 ..... N75-10624 #
AD-784395 ..... N75-10327 #
AD-784410 ..... N75-10330 #
AD-784411 ..... N75-10847 #
AD-784416 ..... N75-10397 #
AD-784419 ..... N75-10759 #
AD-784421 ..... N75-10641 #
AD-784425 ..... N75-10576 #
AD-784433 ..... N75-10431 #
AD-784435 ..... N75-10256 #
AD-784437 ..... N75-10246 #
AD-784438 ..... N75-10398 #
AD-784439 ..... N75-10882*#
AD-784442 ..... N75-10659 #
AD-784443 ..... N75-10660 #
AD-784446 ..... N75-10701 #
AD-784447 ..... N75-10203 #
AD-784448 ..... N75-10257 #
AD-784449 ..... N75-10608 #
AD-784489 ..... N75-10258 #
AD-784496 ..... N75-10467 #
AD-784500 ..... N75-10447 #
AD-784506 ..... N75-10388 #

AD-784514 ..... N75-10793 #
AD-784516 ..... N75-10835 #
AD-784531 ..... N75-10449 #
AD-784532 ..... N75-10450 #
AD-784533 ..... N75-10451 #
AD-784534 ..... N75-10452 #
AD-784549 ..... N75-10085 #
AD-784550 ..... N75-10301 #
AD-784551 ..... N75-10084 #
AD-784572 ..... N75-10666 #
AD-784573 ..... N75-10667 #
AD-784574 ..... N75-10332 #
AD-784589 ..... N75-10448 #
AD-784590 ..... N75-10444 #
AD-784593 ..... N75-10097 #
AD-784594 ..... N75-10075 #
AD-784595 ..... N75-10069 #
AD-784600 ..... N75-10191 #
AD-784623 ..... N75-10046 #
AD-784650 ..... N75-10837 #
AD-784655 ..... N75-10750 #
AD-784676 ..... N75-10838 #
AD-784696 ..... N75-10328 #
AD-784702 ..... N75-10395 #
AD-784708 ..... N75-10597 #
AD-784709 ..... N75-10096 #
AD-784721 ..... N75-10201 #
AD-784723 ..... N75-10200 #

AEDC-TR-74-36 ..... N75-10399 #

AEWES-TR-H-74-6-1 ..... N75-10114 #

AFAL-TR-73-427-VOL-1 ..... N75-10071 #
AFAL-TR-73-427-VOL-2 ..... N75-10072 #

AFAPL-TR-74-30 ..... N75-10098*#
AFAPL-TR-74-47-PT-1 ..... N75-10610 #

AFATL-TR-74-121 ..... N75-10070 #

AFCRL-TR-0039 ..... N75-10335 #

AFFDL-TR-74-7 ..... N75-10032 #
AFFDL-TR-74-48-VOL-1 ..... N75-10064 #
AFFDL-TR-74-48-VOL-2 ..... N75-10065 #
AFFDL-TR-74-48-VOL-3 ..... N75-10066 #
AFFDL-TR-74-48-VOL-4 ..... N75-10067 #

AFML-TR-74-31 ..... N75-10249 #
AFML-TR-74-67 ..... N75-10506 #
AFML-TR-74-126 ..... N75-10445 #
AFML-TR-129-PT-2 ..... N75-10239 #

AFOSR-74-0063TR ..... N75-10238 #
AFOSR-74-0962TR ..... N75-10524 #
AFOSR-74-0968TR ..... N75-10675 #
AFOSR-74-1039TR ..... N75-10812 #
AFOSR-74-1137TR ..... N75-10758 #
AFOSR-74-1197TR ..... N75-10293 #
AFOSR-74-1199TR ..... N75-10815 #
AFOSR-74-1226TR ..... N75-10429 #
AFOSR-74-1253TR ..... N75-10304 #
AFOSR-74-1290TR ..... N75-10510 #
AFOSR-74-1292TR-PT-1 ..... N75-10112 #
AFOSR-74-1292TR-PT-2 ..... N75-10115 #
AFOSR-74-1295TR ..... N75-10511 #

AFRPL-TR-74-42 ..... N75-10176 #

AGARD-AG-182-PT-2 ..... N75-10713 #
AGARD-AG-194 ..... N75-10706 #
AGARD-AG-197 ..... N75-10003 #

AGARD-CP-147-VOL-1 ..... N75-10055*#
AGARD-CP-147-VOL-1 ..... N75-10060*#
AGARD-CP-155 ..... N75-10487 #

AGARD-LS-71 ..... N75-10774 #

AGARD-R-623 ..... N75-10053 #
AGARD-R-624 ..... N75-10054*#

AGARDOGRAPH-182-PT-2 ..... N75-10713 #
AGARDOGRAPH-194 ..... N75-10706 #
AGARDOGRAPH-197 ..... N75-10003 #

AI-72-54 ..... N75-10458*#

AIAA-73-1260 ..... N75-10176 #

AIRESEARCH-74-10325 ..... N75-10409*#

AMRL-TR-73-4 ..... N75-10709 #
AMRL-TR-74-49 ..... N75-10757 #

ANL-CT-75-08 ..... N75-10349 #

ANL-8056 ..... N75-10732 #
ANL-8059 ..... N75-10350 #
ANL-8104 ..... N75-10486 #

APL-TG-1212 ..... N75-10718 #
APL-TG-1226 ..... N75-10425 #
APL-TG-1234 ..... N75-10653 #
APL-TG-1235 ..... N75-10047 #
APL-TG-1243 ..... N75-10747 #

APL/JHU-CP-034-A ..... N75-10049 #
APL/JHU-CP-034-B ..... N75-10050 #
APL/JHU-CP-034-C ..... N75-10051 #

APR-2 ..... N75-10702 #
APR-5 ..... N75-10232 #

AR-2 ..... N75-10616*#
AR-2 ..... N75-10670*#
AR-3 ..... N75-10854 #

ARC-CP-1258 ..... N75-10021 #
ARC-CP-1259 ..... N75-10503 #
ARC-CP-1263 ..... N75-10022 #
ARC-CP-1267 ..... N75-10023 #
ARC-CP-1268 ..... N75-10024 #
ARC-CP-1269 ..... N75-10025 #
ARC-CP-1282 ..... N75-10380 #
ARC-CP-1283 ..... N75-10026 #
ARC-CP-1285 ..... N75-10027 #
ARC-CP-1290 ..... N75-10381 #

ARC-R/M-3741 ..... N75-10028 #
ARC-R/M-3743 ..... N75-10029 #
ARC-R/M-3744 ..... N75-10030 #

ARC-33227 ..... N75-10026 #
ARC-33723 ..... N75-10022 #
ARC-34161 ..... N75-10381 #
ARC-34195 ..... N75-10503 #
ARC-34236 ..... N75-10023 #
ARC-34259 ..... N75-10027 #
ARC-34293 ..... N75-10028 #
ARC-34332 ..... N75-10029 #
ARC-34388 ..... N75-10024 #
ARC-34436 ..... N75-10021 #
ARC-34455 ..... N75-10025 #
ARC-34586 ..... N75-10380 #
ARC-34598 ..... N75-10030 #

ARI-RR-51 ..... N75-10200 #

ARL-TM-74-32 ..... N75-10760 #

ARL-74-5/AFOSR-74-3-PT-1 ..... N75-10112 #
ARL-74-5/AFOSR-74-3-PT-2 ..... N75-10115 #

ARL/MET-NOTE-100 ..... N75-10753 #
ARL/MET-NOTE-103 ..... N75-10227 #
ARL/SM-NOTE-406 ..... N75-10737 #

ARO-VKF-TR-74-12 ..... N75-10399 #

AROD-7101-19-E ..... N75-10838 #
AROD-7996-3-MC ..... N75-10236 #
AROD-9075-3-MC ..... N75-10247 #
AROD-9606-7-P ..... N75-10839 #
AROD-10197-5-EL ..... N75-10727 #

ASPC-1163-FR-1 ..... N75-10264 #

ASR-73-345 ..... N75-10167*#

ATR-74-33-1 ..... N75-10178 #

BBC-BD-1974/30 ..... N75-10274
BBC-BD-1974/31 ..... N75-10434
BBC-BD-1974/32 ..... N75-10275

BDX-613-735-REV ..... N75-10268 #
BDX-613-887-REV ..... N75-10437 #
BDX-613-931-REV ..... N75-10188 #
BDX-613-988-REV ..... N75-10270 #
BDX-613-992 ..... N75-10315 #
BDX-613-1016 ..... N75-10460 #
BDX-613-1067-REV ..... N75-10438 #
BDX-613-1077 ..... N75-10269 #
BDX-613-1080 ..... N75-10830 #
BDX-613-1085-REV ..... N75-10314 #

BHC-299-099-672 ..... N75-10081 #

BM-IC-8643 ..... N75-10271 #
BM-IC-8649 ..... N75-10720 #
BM-IC-8652 ..... N75-10582 #

BM-RI-7895 ..... N75-10846 #
BM-RI-7897 ..... N75-10525 #
BM-RI-7915 ..... N75-10575 #
BM-RI-7949 ..... N75-10208 #
BM-RI-7954 ..... N75-10562*#
BM-RI-7955 ..... N75-10267 #

BM-TPR-81 ..... N75-10579 #
BM-TPR-82 ..... N75-10599 #

BMFT-FB-T-74-05 ..... N75-10318 #
BMFT-FB-T-74-06 ..... N75-10788 #
BMFT-FB-T-74-07 ..... N75-10319 #
BMFT-FB-T-74-08 ..... N75-10728 #
BMFT-FB-T-74-10 ..... N75-10321 #
BMFT-FB-T-74-11 ..... N75-10322 #

BMFT-FB-W-74-02 ..... N75-10159 #

BNL-18772 ..... N75-10716 #

BRL-CR-159 ..... N75-10577 #
BRL-CR-166 ..... N75-10400 #

BRL-MR-2386 ..... N75-10790 #
BRL-MR-2387 ..... N75-10116 #
BRL-MR-2394 ..... N75-10191 #

BR39684 ..... N75-10043 #
BR39806 ..... N75-10867 #
BR40237 ..... N75-10145 #
BR40651 ..... N75-10723 #
BR42406 ..... N75-10110 #
BR42668 ..... N75-10187 #
BR42669 ..... N75-10158 #

BTS-TR-74-13 ..... N75-10851*#

CEM-10R ..... N75-10347*#

CER73-74RNM38 ..... N75-10398 #

CONF-730605-3 ..... N75-10231 #
CONF-731106-6 ..... N75-10189 #
CONF-731112-32 ..... N75-10831 #
CONF-740106-4 ..... N75-10638 #
CONF-740306-3 ..... N75-10833 #
CONF-740306-4 ..... N75-10233 #
CONF-740313-2 ..... N75-10834 #
CONF-740407-1 ..... N75-10590 #
CONF-740407-2 ..... N75-10589 #
CONF-740412-1 ..... N75-10499 #
CONF-740415-1 ..... N75-10469 #
CONF-740509-3 ..... N75-10230 #
CONF-740512-6 ..... N75-10716 #

CONTRIB-37 ..... N75-10672*#

COO-2249-3 ..... N75-10523 #
COO-3077-35 ..... N75-10182 #
COO-3151-37 ..... N75-10832 #
COO-3166-6 ..... N75-10231 #
COO-3284-3 ..... N75-10373 #

CP-38 ..... N75-10435 #

CRC-PUBL-6 ..... N75-10571*#

CRES-TR-177-43 ..... N75-10411*#
CRES-TR-236-2 ..... N75-10569*#

CRIP-MT-91 ..... N75-10500 #

CRSR-580 ..... N75-10722*#

CU-6-74-0383 ..... N75-10272*#

C73-973.8/201 ..... N75-10479 #

DDA-EDR-8134 ..... N75-10098*#

DGLR-72-094 ..... N75-10059*#

DLR-FB-73-14 ..... N75-10235 #
DLR-FB-73-17 ..... N75-10386 #
DLR-FB-73-24 ..... N75-10385 #
DLR-FB-73-31 ..... N75-10384 #
DLR-FB-73-34 ..... N75-10383 #
DLR-FB-73-37 ..... N75-10187 #
DLR-FB-73-72 ..... N75-10103 #
DLR-FB-73-73 ..... N75-10111 #
DLR-FB-73-77 ..... N75-10374 #
DLR-FB-73-97 ..... N75-10292 #
DLR-FB-73-99 ..... N75-10110 #
DLR-FB-73-104 ..... N75-10146 #
DLR-FB-73-107 ..... N75-10234 #
DLR-FB-73-108 ..... N75-10809 #
DLR-FB-73-115 ..... N75-10387 #
DLR-FB-74-07 ..... N75-10263 #
DLR-FB-74-12 ..... N75-10173 #
DLR-FB-74-16 ..... N75-10379 #
DLR-FB-74-17 ..... N75-10018 #
DLR-FB-74-21 ..... N75-10031 #
DLR-FB-74-25 ..... N75-10040 #
DLR-FB-74-28 ..... N75-10761 #
DLR-FB-74-29 ..... N75-10697 #

DLR-MITT-73-26 ..... N75-10262 #
DLR-MITT-74-09 ..... N75-10440 #
DLR-MITT-74-23 ..... N75-10420 #

DME/WAE-1973(2) ..... N75-10107 #

DMS-DR-2080 ..... N75-10153*#
DMS-DR-2113 ..... N75-10148*#
DMS-DR-2139 ..... N75-10152*#
DMS-DR-2145 ..... N75-10151*#
DMS-DR-2152 ..... N75-10360*#
DMS-DR-2159-VOL-1 ..... N75-10108*#
DMS-DR-2159-VOL-2 ..... N75-10109*#
DMS-DR-2172 ..... N75-10170*#
DMS-DR-2197 ..... N75-10154*#

DNA-3344F ..... N75-10431 #
DNA-3350F ..... N75-10813 #

DOC-73SD4249 ..... N75-10548*#
DOC-74SD221 ..... N75-10443 #
DOC-74SD4205 ..... N75-10546*#
DOC-74SD4217 ..... N75-10547*#
DOC-74SD4236 ..... N75-10568*#

DPG-FR-C965A-VOL-1 ..... N75-10666 #
DPG-FR-C965A-VOL-2 ..... N75-10667 #

DR-845 ..... N75-10648 #
DR-847 ..... N75-10649 #
DR-848 ..... N75-10651 #
DR-849 ..... N75-10647 #
DR-850 ..... N75-10650 #
DR-851 ..... N75-10646 #
DR-852 ..... N75-10645 #
DR-854 ..... N75-10644 #

DR/CWG-126-73 ..... N75-10733 #

DREO-TN-74-13 ..... N75-10611 #

DSIS-TN-16-PT-1 ..... N75-10725 #

D3-8684 ..... N75-10351*#
D6-41529 ..... N75-10091*#

E-630-74-06 ..... N75-10141*#
E-7482 ..... N75-10171*#
E-7904 ..... N75-10095*#
E-7987 ..... N75-10172*#

ECOM-74-0108-1 ..... N75-10612 #
ECOM-74-0109-1 ..... N75-10607 #
ECOM-0046-F ..... N75-10331 #
ECOM-0062-3 ..... N75-10442 #
ECOM-4239 ..... N75-10079 #
ECOM-4244 ..... N75-10046 #

EE-ASTN-1827 ..... N75-10122*#

EPA-220/2-74-001 ..... N75-10619 #
EPA-450/1-74-001 ..... N75-10619 #
EPA-450/3-74-032A ..... N75-10601 #
EPA-600/5-74-017 ..... N75-10692 #
EPA-650/4-74-012 ..... N75-10618 #

EPRI-206-0-0-1 ..... N75-10600 #
EPRI-206-0-0-2 ..... N75-10604 #

ERIM-101900-40-L ..... N75-10527*#
ERIM-193500-5-X ..... N75-10564*#
ERIM-195100-1-F ..... N75-10283*#

ESD-TR-74-233 ..... N75-10298 #

ESL-TM362 ..... N75-10282*#
ESL-TM406 ..... N75-10287*#
ESL-TM494 ..... N75-10281*#

ESL-2768-12 ..... N75-10293 #
ESL-2768-13-F ..... N75-10304 #

ESRO-CR(P)-473 ..... N75-10160 #
ESRO-CR(P)-485 ..... N75-10174 #
ESRO-CR(P)-489 ..... N75-10323 #
ESRO-CR(P)-502 ..... N75-10175 #
ESRO-CR(P)-504 ..... N75-10596 #
ESRO-CR(P)-505-VOL-1 ..... N75-10161 #
ESRO-CR(P)-507 ..... N75-10461 #
ESRO-CR(P)-509 ..... N75-10462 #
ESRO-CR(P)-519-VOL-1 ..... N75-10476 #
ESRO-CR(P)-520-VOL-2 ..... N75-10477 #
ESRO-CR(P)-523 ..... N75-10324 #
ESRO-CR(P)-526 ..... N75-10133 #
ESRO-CR(P)-527 ..... N75-10134 #

ESRO-CR-93 ..... N75-10717 #
ESRO-CR-166 ..... N75-10478 #
ESRO-CR-167 ..... N75-10472 #
ESRO-CR-168 ..... N75-10473 #
ESRO-CR-169 ..... N75-10474 #
ESRO-CR-170 ..... N75-10475 #

ESRO-ESTL-3 ..... N75-10461 #
ESRO-ESTL-5 ..... N75-10462 #

ESRO-SL-74-1 ..... N75-10137*#

ESRO-TT-40 ..... N75-10367 #
ESRO-TT-74 ..... N75-10292 #
ESRO-TT-75 ..... N75-10234 #
ESRO-TT-76 ..... N75-10809 #
ESRO-TT-78 ..... N75-10383 #
ESRO-TT-79 ..... N75-10103 #
ESRO-TT-80 ..... N75-10146 #
ESRO-TT-84 ..... N75-10235 #
ESRO-TT-85 ..... N75-10384 #
ESRO-TT-86 ..... N75-10374 #
ESRO-TT-87 ..... N75-10263 #
ESRO-TT-88 ..... N75-10385 #
ESRO-TT-89 ..... N75-10031 #
ESRO-TT-90 ..... N75-10011 #
ESRO-TT-91 ..... N75-10386 #
ESRO-TT-92 ..... N75-10111 #
ESRO-TT-93 ..... N75-10173 #
ESRO-TT-94 ..... N75-10262 #
ESRO-TT-95 ..... N75-10387 #

ESS-3318-111-74 ..... N75-10400 #

ESS/SS-526 ..... N75-10160 #

E74-10730 ..... N75-10526*#
E74-10799 ..... N75-10527*#
E74-10800 ..... N75-10528*#
E74-10801 ..... N75-10529*#
E74-10802 ..... N75-10530*#
E74-10803 ..... N75-10531*#
E74-10804 ..... N75-10532*#
E74-10806 ..... N75-10533*#
E74-10807 ..... N75-10534*#

E74-10808 ..... N75-10535*#
E74-10809 ..... N75-10536*#
E74-10810 ..... N75-10537*#
E74-10811 ..... N75-10538*#
E74-10812 ..... N75-10539*#
E74-10814 ..... N75-10540*#
E74-10815 ..... N75-10541*#
E74-10816 ..... N75-10542*#
E74-10817 ..... N75-10543*#
E74-10818 ..... N75-10544*#

FA-R-2090 ..... N75-10841 #

FAA-RD-74-106 ..... N75-10291 #

FAA-7330.7I ..... N75-10630 #

FB-15 ..... N75-10738 #

FFA-TN-AU-925 ..... N75-10019 #

FFA-124 ..... N75-10020 #

FOA-2-C-2539-D4 ..... N75-10415 #

FPRC-1325 ..... N75-10700 #

FR-74-14-339 ..... N75-10331 #

FSGTR-NC-8 ..... N75-10655 #

FSTC-HT-23-29-74 ..... N75-10242 #
FSTC-HT-23-45-74 ..... N75-10836 #
FSTC-HT-23-174-74 ..... N75-10574 #
FSTC-HT-23-277-74 ..... N75-10245 #
FSTC-HT-23-413-74 ..... N75-10303 #
FSTC-HT-23-415-74 ..... N75-10663 #
FSTC-HT-23-466-74 ..... N75-10789 #
FSTC-HT-23-574-73 ..... N75-10330 #
FSTC-HT-23-0016-74 ..... N75-10606 #
FSTC-HT-23-0027-74 ..... N75-10668 #
FSTC-HT-23-0139-74 ..... N75-10669 #
FSTC-HT-23-0291-74 ..... N75-10705 #
FSTC-HT-23-0326-73 ..... N75-10576 #
FSTC-HT-23-0414-74 ..... N75-10643 #
FSTC-HT-23-1138-73 ..... N75-10847 #
FSTC-HT-23-1195-73 ..... N75-10430 #
FSTC-HT-23-1377-73 ..... N75-10513 #
FSTC-HT-23-1651-73 ..... N75-10710 #
FSTC-HT-23-1784-73 ..... N75-10294 #
FSTC-HT-23-1824-73 ..... N75-10598 #
FSTC-HT-23-1825-73 ..... N75-10514 #
FSTC-HT-23-1842-73 ..... N75-10654 #
FSTC-HT-23-1861-73 ..... N75-10433 #
FSTC-HT-23-2288-72 ..... N75-10796 #
FSTC-HT-23-2372-72 ..... N75-10237 #

FTD-HC-23-2058-74 ..... N75-10177 #

FTD-HT-23-708-74 ..... N75-10077 #
FTD-HT-23-725-74 ..... N75-10096 #
FTD-HT-23-726-74 ..... N75-10099 #
FTD-HT-23-788-74 ..... N75-10078 #
FTD-HT-23-792-74 ..... N75-10597 #
FTD-HT-23-1058-74 ..... N75-10810 #
FTD-HT-23-1113-74 ..... N75-10662 #
FTD-HT-23-1117-74 ..... N75-10395 #
FTD-HT-23-1147-74 ..... N75-10334 #
FTD-HT-23-1175-74 ..... N75-10631 #
FTD-HT-23-1184-74 ..... N75-10328 #
FTD-HT-23-1224-74 ..... N75-10197 #
FTD-HT-23-1302-74 ..... N75-10463 #
FTD-HT-23-1306-74 ..... N75-10465 #
FTD-HT-23-1307-74 ..... N75-10183 #
FTD-HT-23-1474-74 ..... N75-10393 #
FTD-HT-23-1505-74 ..... N75-10505 #
FTD-HT-23-1529-74 ..... N75-10325 #
FTD-HT-23-1706-74 ..... N75-10333 #
FTD-HT-23-2294-74 ..... N75-10198 #
FTD-HT-23-2255-74 ..... N75-10422 #
FTD-HT-23-2318-74 ..... N75-10427 #
FTD-HT-23-2733-74 ..... N75-10201 #

FTD-MT-24-342-74 ..... N75-10508 #
FTD-MT-24-355-74 ..... N75-10512 #
FTD-MT-24-859-74 ..... N75-10454 #
FTD-MT-24-1046-74 ..... N75-10811 #
FTD-MT-24-1163-74 ..... N75-10642 #
FTD-MT-24-1341-74 ..... N75-10466 #
FTD-MT-24-1436-74 ..... N75-10299 #

F74-01 ..... N75-10772*#

GARP-PUBL-14 ..... N75-10639 #

GARP-SPEC-REPT-13 ..... N75-10674 #

GATE-9-PT-1 ..... N75-10633 #
GATE-9-PT-4 ..... N75-10633 #
GATE-9-PT-6 ..... N75-10633 #
GATE-9-PT-7 ..... N75-10633 #

GCV-R-128 ..... N75-10587*#

GER-16010 ..... N75-10032 #

GE73AEG481 ..... N75-10089*#

GPO-25-314 ..... N75-10617 #
GPO-27-032 ..... N75-10580 #
GPO-27-065 ..... N75-10862 #
GPO-27-765 ..... N75-10850 #
GPO-28-577 ..... N75-10516 #
GPO-28-608 ..... N75-10588 #
GPO-28-740 ..... N75-10855 #
GPO-28-964 ..... N75-10861 #
GPO-29-272 ..... N75-10863 #
GPO-29-552 ..... N75-10854 #
GPO-29-660 ..... N75-10259 #
GPO-31-412 ..... N75-10581 #
GPO-31-527 ..... N75-10034 #
GPO-32-403 ..... N75-10859 #
GPO-33-871 ..... N75-10864 #
GPO-35-578 ..... N75-10860 #
GPO-41-253 ..... N75-10764 #
GPO-99-006 ..... N75-10858 #
GPO-99-081 ..... N75-10857 #
GPO-99-081 ..... N75-10866 #

GT-7310-VOL-1 ..... N75-10476 #
GT-7310-VOL-2 ..... N75-10477 #

H-DOC-93-230 ..... N75-10854 #

H-REPT-93-998 ..... N75-10857 #
H-REPT-93-1028-PT-2 ..... N75-10866 #
H-REPT-93-1042 ..... N75-10858 #

H-814 ..... N75-10062*#

HAC-REF-D0573 ..... N75-10311*#

HDL-TR-1657 ..... N75-10848 #

HDL-175-1 ..... N75-10396 #

HSD-TP-7472 ..... N75-10133 #

IAEA-CN-33/A3-1 ..... N75-10802 #
IAEA-CN-33/A15-4 ..... N75-10804 #
IAEA-CN-33/B4-4 ..... N75-10803 #
IAEA-CN-33/G2-3 ..... N75-10805 #

IBM-73W-00050 ..... N75-10468*#

IC-AERO-TN-73-108 ..... N75-10376 #

IC-AERO-73-08 ..... N75-10375 #
IC-AERO-74-04 ..... N75-10376 #
IC-AERO-74-05 ..... N75-10377 #
IC-AERO-74-06 ..... N75-10382 #

IR-2 ..... N75-10287*#
IR-4 ..... N75-10281*#
IR-58-6 ..... N75-10102*#
IR-61-4 ..... N75-10101*#

ISL-37/73 ..... N75-10441 #

ISSN-0082-5255 ..... N75-10149 #

ITR-1 ..... N75-10840 #
ITR-2 ..... N75-10610 #
ITR-2 ..... N75-10842 #

ITTRI-E6224 ..... N75-10295 #

IZP-1974-8 ..... N75-10044 #

JPL-TM-33-585-VOL-1-ADD-1 ..... N75-10890*#
JPL-TM-33-681 ..... N75-10168*#
JPL-TM-33-703 ..... N75-10169*#
JPL-TM-33-706 ..... N75-10142*#
JPL-TM-33-713 ..... N75-10730*#

JPL-900-675 ..... N75-10707*#

JPRS-63034 ..... N75-10856 #
JPRS-63186 ..... N75-10518 #
JPRS-63220 ..... N75-10212 #
JPRS-63231 ..... N75-10869 #

JSC-08571 ..... N75-10135*#
JSC-09052 ..... N75-10136*#
JSC-09106 ..... N75-10156*#

K-SM-10.1.21 ..... N75-10105*#

KNNI-V-257 ..... N75-10640 #

L-9195 ..... N75-10484*#
L-9353 ..... N75-10348*#
L-9384 ..... N75-10485*#
L-9421 ..... N75-10007*#
L-9536 ..... N75-10147*#
L-9554 ..... N75-10765*#
L-9572 ..... N75-10061*#
L-9576 ..... N75-10195*#
L-9619 ..... N75-10006*#
L-9634 ..... N75-10785*#
L-9639 ..... N75-10008*#
L-9663 ..... N75-10038*#
L-9675 ..... N75-10196*#
L-9739 ..... N75-10497*#
L-9744 ..... N75-10009*#
L-9767 ..... N75-10798*#

LA-UR-73-1287 ..... N75-10726 #

LA-5496-MS ..... N75-10439 #
LA-5534-MS ..... N75-10731 #

LBL-3013 ..... N75-10828 #

LC-65-60308 ..... N75-10129*#
LC-73-600267 ..... N75-10193
LC-74-600117 ..... N75-10130*#

LEC-TM-642-508 ..... N75-10721*#

LEC-3093 ..... N75-10136*#
LEC-3949 ..... N75-10570*#
LEC-3964 ..... N75-10156*#

LMSC-D403168 ..... N75-10495*#
LMSC-D403169 ..... N75-10496*#
LMSC-D404808 ..... N75-10892*#

LMSC-HREC-TR-D390222-1 ..... N75-10449 #
LMSC-HREC-TR-D390222-2 ..... N75-10450 #
LMSC-HREC-TR-D390222-3 ..... N75-10451 #
LMSC-HREC-TR-D390222-4 ..... N75-10452 #

LRP-85/74 ..... N75-10808 #

LTR-ENG-17 ..... N75-10090 #

LWL-TR-74-29 ..... N75-10084 #

M-465 ..... N75-10799*#

MATT-1069 ..... N75-10801 #
MATT-1077 ..... N75-10802 #
MATT-1078 ..... N75-10803 #
MATT-1079 ..... N75-10804 #
MATT-1088 ..... N75-10805 #

MBL-1974-4 ..... N75-10698 #

MDC-A2631-VOL-1 ..... N75-10064 #
MDC-A2631-VOL-2 ..... N75-10065 #
MDC-A2631-VOL-3 ..... N75-10066 #
MDC-A2631-VOL-4 ..... N75-10067 #

MLM-2134 ..... N75-10591 #

MRL-TR-74-17C ..... N75-10248 #

MPI-PAE/EXTRATERR-98 ..... N75-10880 #
MPI-PAE/EXTRATERR-101 ..... N75-10896 #
MPI-PAE/TB-EXTRATERR-10 ..... N75-10320 #

MPR-SAT-FE-74-1 ..... N75-10140*#

MR-19 ..... N75-10603 #
MR-20 ..... N75-10603 #
MR-21 ..... N75-10603 #
MR-22 ..... N75-10603 #
MR-23 ..... N75-10603 #
MR-24 ..... N75-10603 #
MR-25 ..... N75-10603 #
MR-26 ..... N75-10603 #
MR-27 ..... N75-10603 #
MR-28 ..... N75-10603 #
MR-29 ..... N75-10603 #
MR-30 ..... N75-10603 #
MR-31 ..... N75-10603 #
MR-32 ..... N75-10603 #
MR-33 ..... N75-10603 #
MR-34 ..... N75-10603 #
MR-35 ..... N75-10603 #
MR-36 ..... N75-10603 #
MR-37 ..... N75-10603 #

NAD-CR-RDTR-270 ..... N75-10665 #

NAD-CR-TR-7022/C74/1 ..... N75-10326 #

NASA-CASE-LAR-11552-1 ..... N75-10412*#

NASA-CASE-MFS-22060-1 ..... N75-10414*#
NASA-CASE-MFS-22743-1 ..... N75-10585*#
NASA-CASE-MFS-22744-1 ..... N75-10586*#
NASA-CASE-MFS-22905-1 ..... N75-10407*#
NASA-CASE-MFS-22907-1 ..... N75-10210*#
NASA-CASE-MFS-22991-1 ..... N75-10366*#
NASA-CASE-MFS-23047-1 ..... N75-10459*#

NASA-CASE-NPO-13059-1 ..... N75-10456*#
NASA-CASE-NPO-13436-1 ..... N75-10456*#

NASA-CR-2434 ..... N75-10104*#
NASA-CR-2446 ..... N75-10089*#
NASA-CR-2457 ..... N75-10875*#
NASA-CR-2459 ..... N75-10545*#
NASA-CR-2471 ..... N75-10093*#
NASA-CR-2476 ..... N75-10358*#
NASA-CR-2479 ..... N75-10094*#
NASA-CR-114497 ..... N75-10005*#
NASA-CR-120336 ..... N75-10745*#
NASA-CR-120355 ..... N75-10584*#
NASA-CR-120482 ..... N75-10120*#
NASA-CR-120497 ..... N75-10468*#
NASA-CR-120504 ..... N75-10495*#
NASA-CR-120505 ..... N75-10496*#
NASA-CR-120507 ..... N75-10122*#
NASA-CR-120511 ..... N75-10225*#
NASA-CR-120512 ..... N75-10311*#
NASA-CR-120516 ..... N75-10772*#
NASA-CR-120848 ..... N75-10351*#
NASA-CR-129008 ..... N75-10736*#
NASA-CR-129037 ..... N75-10117*#
NASA-CR-129038 ..... N75-10119*#
NASA-CR-129041 ..... N75-10118*#
NASA-CR-132457 ..... N75-10406*#
NASA-CR-132487 ..... N75-10155*#
NASA-CR-132516 ..... N75-10041*#
NASA-CR-132522 ..... N75-10106*#
NASA-CR-132534 ..... N75-10891*#
NASA-CR-134111 ..... N75-10148*#
NASA-CR-134407 ..... N75-10152*#
NASA-CR-134410 ..... N75-10108*#
NASA-CR-134412 ..... N75-10109*#
NASA-CR-134415 ..... N75-10170*#
NASA-CR-134417 ..... N75-10153*#
NASA-CR-134418 ..... N75-10154*#
NASA-CR-134420 ..... N75-10151*#
NASA-CR-134423 ..... N75-10360*#
NASA-CR-134509 ..... N75-10163*#
NASA-CR-134526 ..... N75-10209*#
NASA-CR-134618 ..... N75-10091*#
NASA-CR-134661 ..... N75-10092*#
NASA-CR-134671 ..... N75-10455*#
NASA-CR-134686 ..... N75-10150*#
NASA-CR-134700 ..... N75-10087*#
NASA-CR-134732 ..... N75-10251*#

NASA-CR-137469 ..... N75-10673*#
NASA-CR-137470 ..... N75-10671*#
NASA-CR-137473 ..... N75-10143*#
NASA-CR-137475 ..... N75-10566*#
NASA-CR-137476 ..... N75-10571*#
NASA-CR-139122 ..... N75-10312*#
NASA-CR-139123 ..... N75-10853*#
NASA-CR-139124 ..... N75-10851*#
NASA-CR-139125 ..... N75-10287*#
NASA-CR-139128 ..... N75-10289*#
NASA-CR-139129 ..... N75-10288*#
NASA-CR-139130 ..... N75-10286*#
NASA-CR-139131 ..... N75-10284*#
NASA-CR-139132 ..... N75-10157*#
NASA-CR-139134 ..... N75-10746*#
NASA-CR-139135 ..... N75-10281*#
NASA-CR-139136 ..... N75-10282*#
NASA-CR-139140 ..... N75-10347*#
NASA-CR-139182 ..... N75-10572*#
NASA-CR-139576 ..... N75-10526*#
NASA-CR-140255 ..... N75-10102*#
NASA-CR-140279 ..... N75-10101*#
NASA-CR-140300 ..... N75-10691*#
NASA-CR-140303 ..... N75-10283*#
NASA-CR-140304 ..... N75-10721*#
NASA-CR-140312 ..... N75-10409*#
NASA-CR-140313 ..... N75-10042*#
NASA-CR-140314 ..... N75-10569*#
NASA-CR-140316 ..... N75-10128*#
NASA-CR-140317 ..... N75-10411*#
NASA-CR-140319 ..... N75-10127*#
NASA-CR-140321 ..... N75-10167*#
NASA-CR-140493 ..... N75-10527*#
NASA-CR-140494 ..... N75-10528*#
NASA-CR-140495 ..... N75-10529*#
NASA-CR-140496 ..... N75-10530*#
NASA-CR-140497 ..... N75-10531*#
NASA-CR-140498 ..... N75-10532*#
NASA-CR-140500 ..... N75-10533*#
NASA-CR-140501 ..... N75-10534*#
NASA-CR-140502 ..... N75-10535*#
NASA-CR-140503 ..... N75-10536*#
NASA-CR-140504 ..... N75-10537*#
NASA-CR-140505 ..... N75-10538*#
NASA-CR-140569 ..... N75-10539*#
NASA-CR-140572 ..... N75-10876*#
NASA-CR-140577 ..... N75-10562*#
NASA-CR-140581 ..... N75-10892*#
NASA-CR-140557 ..... N75-10139*#
NASA-CR-140598 ..... N75-10616*#
NASA-CR-140599 ..... N75-10715*#
NASA-CR-140600 ..... N75-10889*#
NASA-CR-140601 ..... N75-10670*#
NASA-CR-140602 ..... N75-10722*#
NASA-CR-140603 ..... N75-10086*#
NASA-CR-140604 ..... N75-10672*#
NASA-CR-140605 ..... N75-10266*#
NASA-CR-140616 ..... N75-10540*#
NASA-CR-140617 ..... N75-10541*#
NASA-CR-140618 ..... N75-10542*#
NASA-CR-140619 ..... N75-10543*#
NASA-CR-140620 ..... N75-10544*#
NASA-CR-140652 ..... N75-10378*#
NASA-CR-140653 ..... N75-10404*#
NASA-CR-140665 ..... N75-10563*#
NASA-CR-140666 ..... N75-10165*#
NASA-CR-140667 ..... N75-10773*#
NASA-CR-140668 ..... N75-10690*#
NASA-CR-140669 ..... N75-10408*#
NASA-CR-140670 ..... N75-10877*#
NASA-CR-140671 ..... N75-10357*#
NASA-CR-140672 ..... N75-10583*#
NASA-CR-140673 ..... N75-10088*#
NASA-CR-140674 ..... N75-10564*#
NASA-CR-140675 ..... N75-10708*#
NASA-CR-140676 ..... N75-10888*#
NASA-CR-140678 ..... N75-10272*#
NASA-CR-140679 ..... N75-10791 #
NASA-CR-140680 ..... N75-10882*#
NASA-CR-140683 ..... N75-10879*#
NASA-CR-140684 ..... N75-10181*#
NASA-CR-140685 ..... N75-10693*#
NASA-CR-140686 ..... N75-10457*#
NASA-CR-140689 ..... N75-10695*#
NASA-CR-140699 ..... N75-10893*#
NASA-CR-140700 ..... N75-10890*#
NASA-CR-140701 ..... N75-10878*#
NASA-CR-140702 ..... N75-10894*#
NASA-CR-140703 ..... N75-10696*#
NASA-CR-140704 ..... N75-10142*#
NASA-CR-140705 ..... N75-10169*#
NASA-CR-140706 ..... N75-10168*#
NASA-CR-140707 ..... N75-10730*#
NASA-CR-140708 ..... N75-10694*#
NASA-CR-140709 ..... N75-10844*#
NASA-CR-140710 ..... N75-10403*#
NASA-CR-140711 ..... N75-10568*#
NASA-CR-140712 ..... N75-10546*#
NASA-CR-140713 ..... N75-10458*#
NASA-CR-140806 ..... N75-10707*#
NASA-CR-140807 ..... N75-10712*#
NASA-CR-140808 ..... N75-10678*#
NASA-CR-140809 ..... N75-10548*#
NASA-CR-140810 ..... N75-10547*#
NASA-CR-140939 ..... N75-10054*#

NASA-HF-74-1 ..... N75-10137*#

NASA-NEWS-RELEASE-74-292 ..... N75-10123*#
NASA-NEWS-RELEASE-74-303 ..... N75-10124*#
NASA-NEWS-RELEASE-74-305 ..... N75-10131*#

NASA-SP-349 ..... N75-10130*#
NASA-SP-356 ..... N75-10549*#
NASA-SP-4017 ..... N75-10129*#
NASA-SP-7011(132) ..... N75-10684*+
NASA-SP-7037(47) ..... N75-10001*+
NASA-SP-7037(48) ..... N75-10002*+
NASA-SP-8100 ..... N75-10166*#

NASA-TM-X-3038 ..... N75-10348*#
NASA-TM-X-3071 ..... N75-10484*#
NASA-TM-X-3091 ..... N75-10485*#
NASA-TM-X-3106 ..... N75-10095*#
NASA-TM-X-3111 ..... N75-10171*#
NASA-TM-X-3112 ..... N75-10196*#
NASA-TM-X-3116 ..... N75-10172*#
NASA-TM-X-58128 ..... N75-10135*#
NASA-TM-X-62374 ..... N75-10004*#
NASA-TM-X-62384 ..... N75-10057*#
NASA-TM-X-62385 ..... N75-10741*#
NASA-TM-X-62390 ..... N75-10058*#
NASA-TM-X-64814 ..... N75-10138*#
NASA-TM-X-64820 ..... N75-10121*#
NASA-TM-X-64841 ..... N75-10164*#
NASA-TM-X-64853 ..... N75-10126*#
NASA-TM-X-64888 ..... N75-10313*#
NASA-TM-X-70762 ..... N75-10413*#
NASA-TM-X-70763 ..... N75-10567*#
NASA-TM-X-70764 ..... N75-10285*#
NASA-TM-X-70768 ..... N75-10621*#
NASA-TM-X-70770 ..... N75-10899*#
NASA-TM-X-71941 ..... N75-10359*#
NASA-TM-X-72000 ..... N75-10356*#
NASA-TM-X-72015 ..... N75-10786*#
NASA-TM-X-72019 ..... N75-10140*#
NASA-TM-X-72028 ..... N75-10136*#
NASA-TM-X-72029 ..... N75-10570*#
NASA-TM-X-72030 ..... N75-10156*#
NASA-TM-X-72031 ..... N75-10137*#
NASA-TM-X-72032 ..... N75-10105*#
NASA-TM-X-72050 ..... N75-10125*#
NASA-TM-X-72530 ..... N75-10141*#
NASA-TM-X-72533 ..... N75-10410*#

NASA-TN-D-7692 ..... N75-10147*#
NASA-TN-D-7727 ..... N75-10785*#
NASA-TN-D-7740 ..... N75-10038*#
NASA-TN-D-7749 ..... N75-10006*#
NASA-TN-D-7759 ..... N75-10007*#
NASA-TN-D-7760 ..... N75-10061*#
NASA-TN-D-7765 ..... N75-10798*#
NASA-TN-D-7768 ..... N75-10008*#
NASA-TN-D-7769 ..... N75-10195*#
NASA-TN-D-7776 ..... N75-10009*#
NASA-TN-D-7779 ..... N75-10497*#

NASA-TR-R-427 ..... N75-10765*#
NASA-TR-R-433 ..... N75-10062*#
NASA-TR-R-435 ..... N75-10799*#

NASA-TT-F-800 ..... N75-10886*#
NASA-TT-F-810 ..... N75-10036*#
NASA-TT-F-814 ..... N75-10744*#
NASA-TT-F-15715 ..... N75-10752*#
NASA-TT-F-15767 ..... N75-10884*#
NASA-TT-F-15833 ..... N75-10352*#
NASA-TT-F-15849 ..... N75-10679*#

NASA-TT-F-15864 ..... N75-10685*#
NASA-TT-F-15879 ..... N75-10686*#
NASA-TT-F-15912 ..... N75-10865*#
NASA-TT-F-15933 ..... N75-10687*#
NASA-TT-F-15973 ..... N75-10688*#
NASA-TT-F-15974 ..... N75-10517*#
NASA-TT-F-15976 ..... N75-10565*#
NASA-TT-F-15981 ..... N75-10519*#
NASA-TT-F-15982 ..... N75-10587*#
NASA-TT-F-15983 ..... N75-10194*#
NASA-TT-F-15985 ..... N75-10521*#
NASA-TT-F-15989 ..... N75-10353*#
NASA-TT-F-15990 ..... N75-10252*#
NASA-TT-F-15991 ..... N75-10354*#
NASA-TT-F-15992 ..... N75-10355*#
NASA-TT-F-15993 ..... N75-10056*#
NASA-TT-F-15994 ..... N75-10211*#
NASA-TT-F-15995 ..... N75-10207*#
NASA-TT-F-15996 ..... N75-10055*#
NASA-TT-F-15997 ..... N75-10060*#
NASA-TT-F-15998 ..... N75-10059*#
NASA-TT-F-15999 ..... N75-10405*#
NASA-TT-F-16000 ..... N75-10887*#
NASA-TT-F-16001 ..... N75-10689*#
NASA-TT-F-16002 ..... N75-10628*#
NASA-TT-F-16003 ..... N75-10622*#

NBS-TN-839 ..... N75-10404*#

NBSIR-73-206 ..... N75-10180 #
NBSIR-73-281 ..... N75-10238 #
NBSIR-73-301 ..... N75-10403*#
NBSIR-73-338 ..... N75-10844*#
NBSIR-73-339 ..... N75-10266*#

NC-98 ..... N75-10629 #

NMAB-317 ..... N75-10273 #

NOLTR-74-105 ..... N75-10392 #
NOLTR-74-106 ..... N75-10397 #

NOTA-INTERNA-542 ..... N75-10766 #
NOTA-INTERNA-555 ..... N75-10767 #

NPL-NAC-47 ..... N75-10724 #

NPS-51CJ74081 ..... N75-10652 #
NPS-51HAW074081 ..... N75-10664 #

NRC-TOX-P795 ..... N75-10703 #

NRL-MR-2833 ..... N75-10816 #
NRL-MR-2836 ..... N75-10327 #
NRL-MR-2843 ..... N75-10626 #

NRL-7760 ..... N75-10627 #
NRL-7763 ..... N75-10624 #
NRL-7776 ..... N75-10296 #

NSF-RA/N-74-036 ..... N75-10605 #
NSF-RA/N-74-038 ..... N75-10602 #

NSF/IDOE-74-16 ..... N75-10676 #
NSF/IDOE-74-18 ..... N75-10681 #
NSF/IDOE-74-19 ..... N75-10682 #
NSF/IDOE-74-20 ..... N75-10683 #

NSRDC-4411 ..... N75-10509 #

NSRDS-NBS-49 ..... N75-10193

NSSDC-74-02 ..... N75-10410*#

NTSB-ARG-74-2 ..... N75-10037 #

OB22-02-1-1292 ..... N75-10080 #

OE-74-10 ..... N75-10464 #

ONR-TR-4 ..... N75-10199 #
ONR-TR-19 ..... N75-10443 #

ONRL-R-2-74 ..... N75-10391 #

OR-13225 ..... N75-10312*#

ORNL-EIS-74-52-VOL-2-NO-1 ..... N75-10592 #

ORNL-NSF-EP-68 ..... N75-10039 #

OWRR-A-029-HI(1) ..... N75-10656 #

OWRR-B-036-RI(4) ..... N75-10202 #

PAPER-L.4.2 ..... N75-10678*#

PAPER-V.4.4 ..... N75-10712*#

PB-232747/6 ..... N75-10113 #
PB-232940/7 ..... N75-10868 #
PB-233263/3 ..... N75-10603 #
PB-233374/8 ..... N75-10619 #
PB-233427/4 ..... N75-10525 #
PB-233429/0 ..... N75-10618 #
PB-233432/4 ..... N75-10202 #
PB-233674/1 ..... N75-10656 #
PB-233847/3 ..... N75-10625 #
PB-233882/0 ..... N75-10748 #
PB-233883/8 ..... N75-10749 #
PB-233949/7 ..... N75-10602 #
PB-233956/2 ..... N75-10605 #
PB-233958/8 ..... N75-10676 #
PB-233997/6 ..... N75-10271 #
PB-234005/7 ..... N75-10657 #
PB-234006/5 ..... N75-10658 #
PB-234053/7 ..... N75-10575 #
PB-234057/8 ..... N75-10681 #
PB-234058/6 ..... N75-10682 #
PB-234059/4 ..... N75-10683 #
PB-234070/1 ..... N75-10846 #
PB-234158/4 ..... N75-10655 #
PB-234185/7 ..... N75-10601 #
PB-234202/0 ..... N75-10600 #
PB-234203/8 ..... N75-10604 #

PHL-1974-22 ..... N75-10421 #
PHL-1974-23 ..... N75-10573 #

PINY-AE/AM-74-5 ..... N75-10511 #

PINY-EE/EP-74-138 ..... N75-10793 #

PPG-188 ..... N75-10889*#

PR-1 ..... N75-10534*#
PR-24 ..... N75-10272*#

PRRL-74-CR-10 ..... N75-10840 #
PRRL-74-CR-34 ..... N75-10842 #

PSL-PS00792 ..... N75-10335 #

PSU-IRL-SCI-432 ..... N75-10800 #

PUBL-84/7M ..... N75-10522 #
PUBL-1353 ..... N75-10889*#

PWA-FR-6328 ..... N75-10100 #

P74-438 ..... N75-10311*#

QPR-1 ..... N75-10602 #
QPR-3 ..... N75-10165*#

QR-1 ..... N75-10607 #
QR-1 ..... N75-10612 #
QR-3 ..... N75-10329 #
QR-3 ..... N75-10795 #

R-74-056 ..... N75-10661 #
R-1046-ARPA ..... N75-10660 #
R-1207 ..... N75-10069 #
R-1549-ARPA ..... N75-10659 #
R-4192-02 ..... N75-10289*#
R-4255 ..... N75-10680 #

RADC-TR-74-123 ..... N75-10297 #
RADC-TR-74-147 ..... N75-10045 #
RADC-TR-74-154 ..... N75-10609 #
RADC-TR-74-184 ..... N75-10265 #

RAE-LIB-TRANS-1751 ..... N75-10110 #
RAE-LIB-TRANS-1764 ..... N75-10187 #
RAE-LIB-TRANS-1771 ..... N75-10158 #

RAE-TR-71173 ..... N75-10022 #

RAE-TR-72083 ..... N75-10029 #
RAE-TR-72107 ..... N75-10503 #
RAE-TR-72124 ..... N75-10023 #
RAE-TR-72193 ..... N75-10024 #
RAE-TR-72202 ..... N75-10025 #
RAE-TR-72211 ..... N75-10030 #
RAE-TR-72227 ..... N75-10021 #
RAE-TR-73154 ..... N75-10043 #
RAE-TR-73169 ..... N75-10867 #
RAE-TR-73177 ..... N75-10723 #
RAE-TR-73195 ..... N75-10145 #

RDTR-1759-4 ..... N75-10192 #

RE-488 ..... N75-10363 #

REF-D0796 ..... N75-10853*#

REF-N74-18 ..... N75-10676 #

REPT-74-1 ..... N75-10467 #
REPT-74-9D4-KERAM-R2 ..... N75-10255 #
REPT-74-0462 ..... N75-10300 #
REPT-311.271 ..... N75-10134 #
REPT-1974-7 ..... N75-10885 #
REPT-1974-9 ..... N75-10883 #
REPT-2170 ..... N75-10832 #
REPT-6866 ..... N75-10280 #
REPT-50601 ..... N75-10106*#
REPT-010757 ..... N75-10758 #

RK-CR-73-2 ..... N75-10449 #
RK-CR-74-9-PT-3 ..... N75-10446 #
RK-CR-74-11 ..... N75-10448 #
RK-CR-74-12 ..... N75-10444 #
RK-CR-74-13-VOL-1 ..... N75-10449 #
RK-CR-74-13-VOL-2 ..... N75-10450 #
RK-CR-74-13-VOL-3 ..... N75-10451 #
RK-CR-74-13-VOL-4 ..... N75-10452 #

RM-589 ..... N75-10186 #
RM-591 ..... N75-10829 #
RM-592 ..... N75-10226 #

RR-74-SM-1 ..... N75-10510 #
RR-143/NBR/KPSBR-5 ..... N75-10734 #

RSC-53 ..... N75-10563*#

RTI-250-711-3 ..... N75-10618 #

RTOP-161-05-02 ..... N75-10773*#

SAAB-TN-69 ..... N75-10010 #

SAI-73-512-AQ ..... N75-10813 #

SAM-TR-74-9 ..... N75-10711 #

SAMSO-TR-73-85-VOL-2 ..... N75-10791 #
SAMSO-TR-74-51-VOL-1 ..... N75-10719 #
SAMSO-TR-74-115 ..... N75-10794 #
SAMSO-TR-74-133 ..... N75-10795 #

SAO-406-057 ..... N75-10891*#

SAPR-19 ..... N75-10750 #

SASR-4 ..... N75-10690*#

SCG-40264R ..... N75-10853*#

SER-C/DISS-198 ..... N75-10132 #

SERIAL-149-VOL-23-NO-6 ..... N75-10483 #
SERIAL-150-VOL-24-NO-1 ..... N75-10310 #

SLA-73-1034 ..... N75-10261 #
SLA-73-1045 ..... N75-10317 #
SLA-73-1049 ..... N75-10316 #
SLA-73-1087 ..... N75-10471 #
SLA-73-1099 ..... N75-10228 #
SLA-73-5677 ..... N75-10189 #
SLA-73-5805 ..... N75-10833 #
SLA-73-5810 ..... N75-10233 #
SLA-73-5827 ..... N75-10499 #
SLA-73-5931 ..... N75-10469 #
SLA-73-7069 ..... N75-10590 #
SLA-73-7074 ..... N75-10834 #

SLA-74-93 ..... N75-10470 #
SLA-74-101 ..... N75-10416 #
SLA-74-112 ..... N75-10290 #
SLA-74-117 ..... N75-10895 #
SLA-74-5002 ..... N75-10589 #
SLA-74-5186 ..... N75-10418 #

SLL-72-105 ..... N75-10417 #
SLL-73-292 ..... N75-10787 #

SQUID-TR-GE-2-PU ..... N75-10390 #

SR-1 ..... N75-10335 #
SR-432 ..... N75-10800 #

SRL-TR-74-0010 ..... N75-10424 #
SRL-TR-74-0012 ..... N75-10048 #
SRL-TR-74-0013 ..... N75-10184 #

SSS-R-74-2344 ..... N75-10436 #

STEWS-ID-74-2 ..... N75-10426 #

SU-326-P-17-X-5 ..... N75-10498 #

S13-116 ..... N75-10545*#

T(F)S/033 ..... N75-10175 #

T-560 ..... N75-10042*#

T/AM-391 ..... N75-10507 #

TASC-TR-385-1 ..... N75-10162 #

TDCK-65199 ..... N75-10421 #
TDCK-65200 ..... N75-10573 #

THEMIS-ONR-TR-28 ..... N75-10398 #

TI-03-74-18 ..... N75-10329 #

TID-3349 ..... N75-10578 *

TN-1974-40 ..... N75-10298 #

TP-19 ..... N75-10625 #

TR-D390056 ..... N75-10117*#

TR-EE/CS-74-5 ..... N75-10538*#

TR-1 ..... N75-10256 #
TR-1 ..... N75-10258 #
TR-2 ..... N75-10736*#
TR-4 ..... N75-10199 #
TR-19 ..... N75-10243 #
TR-20 ..... N75-10241 #
TR-21 ..... N75-10244 #
TR-27 ..... N75-10388 #
TR-72 ..... N75-10656 #
TR-403209 ..... N75-10708*#

TRITA-EPP-74-11 ..... N75-10806 #
TRITA-EPP-74-12 ..... N75-10807 #

TRRL-LR-622 ..... N75-10868 #

TRW-AT-SVD-TR-74-6 ..... N75-10429 #
TRW-AT-SVD-TR-74-7 ..... N75-10759 #

TRW-13900-6012-R0-01 ..... N75-10157*#
TRW-24888-6001-RU-00 ..... N75-10150*#

TSC-FAA-74-18 ..... N75-10291 #

TT-74-50008 ..... N75-10623 #
TT-7403 ..... N75-10378*#
TT-7404 ..... N75-10754 #
TT-7405 ..... N75-10755 #
TT-7406 ..... N75-10756 #

TW-555 ..... N75-10587*#

T301-10194-1 ..... N75-10082 #
T301-10194-2 ..... N75-10082 #
T301-10237-1 ..... N75-10097 #

U-OF-IOWA-74-26 ..... N75-10888*#

UAH-RR-154 ..... N75-10453 #

UARL-N911340-13 ..... N75-10447 #

UCID-16469 ..... N75-10260 #

UCLA-34-P-172-11 ..... N75-10232 #

UCRL-51487 ..... N75-10593 #
UCRL-51511 ..... N75-10594 #
UCRL-74832 ..... N75-10831 #
UCRL-75209 ..... N75-10253 #
UCRL-75278 ..... N75-10230 #
UCRL-75556 ..... N75-10638 #
UCRL-75630 ..... N75-10229 #

UFE-895-72(OE) ..... N75-10059*#

UILU-ENG-74-6013 ..... N75-10507 #

UKY-TR84-74-MET19 ..... N75-10251*#

UM-74-1 ..... N75-10389 #

US-PATENT-APPL-SN-513690 ..... N75-10456*#
US-PATENT-APPL-SN-518544 ..... N75-10586*#
US-PATENT-APPL-SN-518545 ..... N75-10407*#
US-PATENT-APPL-SN-518546 ..... N75-10210*#
US-PATENT-APPL-SN-518684 ..... N75-10585*#
US-PATENT-APPL-SN-518685 ..... N75-10412*#
US-PATENT-APPL-SN-521006 ..... N75-10366*#
US-PATENT-APPL-SN-521602 ..... N75-10459*#
US-PATENT-APPL-SN-521603 ..... N75-10414*#

USAAMRDL-TR-74-16 ..... N75-10097 #
USAAMRDL-TR-74-22 ..... N75-10082 #
USAAMRDL-TR-74-25 ..... N75-10075 #
USAAMRDL-TR-74-28 ..... N75-10428 #
USAAMRDL-TR-74-35 ..... N75-10074 #
USAAMRDL-TR-74-36 ..... N75-10073 #
USAAMRDL-TR-74-39 ..... N75-10083 #
USAAMRDL-TR-74-43 ..... N75-10080 #
USAAMRDL-TR-74-46 ..... N75-10100 #
USAAMRDL-TR-74-54 ..... N75-10081 #
USAAMRDL-TR-74-58 ..... N75-10063 #
USAAMRDL-TR-74-60 ..... N75-10069 #

USAFA-TR-74-11 ..... N75-10704 #
USAFA-TR-74-12 ..... N75-10814 #

USDA-ME-277 ..... N75-10735 #

USNA-ISPR-53 ..... N75-10076 #

UTIAS-188 ..... N75-10149 #

UTX-A/P-73-55 ..... N75-10113 #

VPI-ESM-DOD-1 ..... N75-10504 #

WANL-M-FR-74-005 ..... N75-10209*#

WASH-1281-4 ..... N75-10595 #

WB-5/73 ..... N75-10501 #

WHOI-74-59 ..... N75-10641 #

WQEC/C-74-511 ..... N75-10583*#

W74-09255 ..... N75-10202 #
W74-09655 ..... N75-10656 #

X-621-74-283 ..... N75-10621*#
X-660-74-258 ..... N75-10899*#
X-693-74-267 ..... N75-10285*#
X-921-74-242 ..... N75-10413*#
X-921-74-250 ..... N75-10567*#

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC

NASA distributes its technical documents and bibliographic tools to ten special libraries located in the organizations listed below. Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention.

CALIFORNIA
University of California, Berkeley

COLORADO
University of Colorado, Boulder

DISTRICT OF COLUMBIA
Library of Congress

GEORGIA
Georgia Institute of Technology, Atlanta

ILLINOIS
The John Crerar Library, Chicago

MASSACHUSETTS
Massachusetts Institute of Technology, Cambridge

MISSOURI
Linda Hall Library, Kansas City

NEW YORK
Columbia University, New York

PENNSYLVANIA
Carnegie Library of Pittsburgh

WASHINGTON
University of Washington, Seattle

NASA publications (those indicated by an "*" following the accession number) are also received by the following public and free libraries:

CALIFORNIA
Los Angeles Public Library
San Diego Public Library

COLORADO
Denver Public Library

CONNECTICUT
Hartford Public Library

MARYLAND
Enoch Pratt Free Library, Baltimore

MASSACHUSETTS
Boston Public Library

MICHIGAN
Detroit Public Library

MINNESOTA
Minneapolis Public Library

MISSOURI
Kansas City Public Library
St. Louis Public Library

NEW JERSEY
Trenton Public Library

NEW YORK
Brooklyn Public Library
Buffalo and Erie County Public Library
Rochester Public Library
New York Public Library

OHIO
Akron Public Library
Cincinnati Public Library
Cleveland Public Library
Dayton Public Library
Toledo Public Library

OKLAHOMA
Oklahoma County Libraries, Oklahoma City

TENNESSEE
Memphis Public Library

TEXAS
Dallas Public Library
Fort Worth Public Library

WASHINGTON
Seattle Public Library

WISCONSIN
Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 750 Third Avenue, New York, New York, 10017.

EUROPEAN

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. By virtue of arrangements other than with NASA, the British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy or microfiche of NASA and NASA-sponsored documents, those identified by both the symbols "#" and "*", from: ESRO/ELDO Space Documentation Service, European Space Research Organization, 114, av. Charles de Gaulle, 92-Neuilly-sur-Seine, France.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

SPECIAL FOURTH CLASS MAIL
Book

POSTAGE AND FEES PAID
NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
NASA-451

U.S.MAIL

POSTMASTER : If Undeliverable (Section
Postal Manual) Do Not Re

U.S.MAIL